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PROPELLANT SURVEILLANCE REPORT LGM-30 F & G STAGE I. PHASE G. S--ETC(U)
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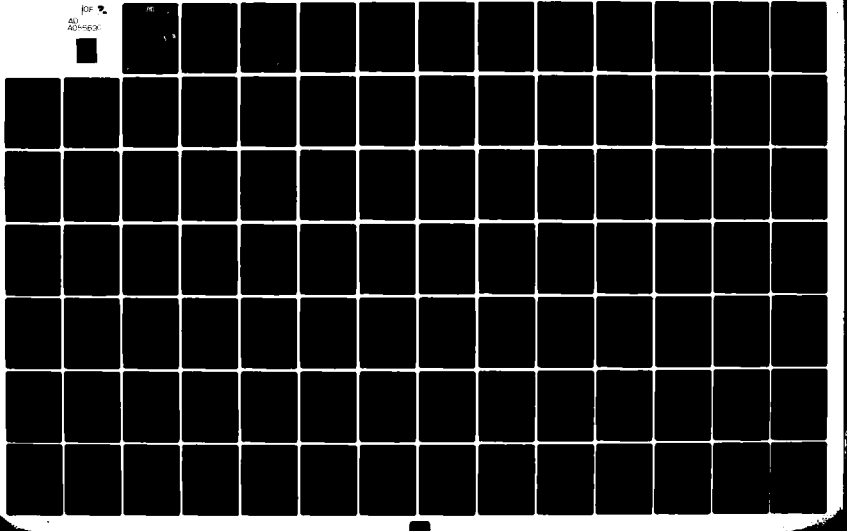

LEVEL II

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OGDEN AIR LOGISTICS CENTER

UNITED STATES AIR FORCE

HILL AIR FORCE BASE, UTAH 84056

AD A085630

# PROPELLANT SURVEILLANCE REPORT LGM-30 F&G STAGE 1 PHASE G, SERIES I TP-H1011

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PROPELLANT ANALYSIS LABORATORY

MAKPH REPORT

438(80)

April 1980

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MAKPH REPORT NO 438(80)
MMWRM PROJECT M04046C-WNL0529

# PROPELLANT SURVEILLANCE REPORT
# LGM-30 F & G STAGE 1 (TP-H1011)

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April 1980

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## ABSTRACT

This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30 F and G First Stage Minuteman Motors. This report uses a statistical approach to analyze the bulk carton propellant data. Testing was accomplished in accordance with MMWRM Project M04046C-WNL01529.

The data from this test period are combined with data from previous testing and entered into the G085 Computer for storage, analysis and regression analysis. From the statistical analysis of all data tested to date (fourteen years for F and G), significant degradation of the propellant does not appear likely for at least two years past the oldest data point.

Each point on the regression plot represents the mean of all samples at that particular age. The number of samples at each point is indicated on the sample size summary sheet on the page accompanying each regression plot or group of regression plots. The data range at any age can be found by suitable inquiry of the G085 system.



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Distribution/
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TABLE OF CONTENTS


| | Page |
|---|---|
| Abstract | ii |
| List of Figures | iv |
| List of References | viii |
| Glossary of Terms and Abbreviations | xiii |
| Introduction | 1 |
| Table 1 - Test Program | 3 |
| Statistical Approach | 4 |
| Test Results | 6 |
| Conclusions | 10 |
| Distribution List | 117 |
| DD 1473 | 118 |

LIST OF FIGURES


| Figure Nr | | Page |
|---|---|---|
| | Regression Plot, Very Low Rate Tensile | |
| 1 | Strain at Maximum Stress | 12 |
| 2 | Maximum Stress | 13 |
| 3 | Strain at Rupture | 14 |
| 4 | Stress at Rupture | 16 |
| 5 | Modulus | 18 |
| | Regression Plot, Low Rate Biaxial Tensile | |
| 6 | Strain at Maximum Stress | 20 |
| 7 | Maximum Stress | 21 |
| 8 | Strain at Rupture | 22 |
| 9 | Stress at Rupture | 23 |
| 10 | Modulus | 24 |
| | Regression Plot, Low Rate Tensile | |
| 11 | Strain at Maximum Stress | 26 |
| 12 | Maximum Stress | 27 |
| 13 | Strain at Rupture | 28 |
| 14 | Stress at Rupture | 29 |
| 15 | Modulus | 30 |
| | Regression Plot, High Rate Triaxial Tensile | |
| 16 | Strain at Maximum Stress | 32 |
| 17 | Maximum Stress | 33 |
| 18 | Strain at Rupture | 34 |
| 19 | Stress at Rupture | 35 |
| 20 | Modulus | 36 |

LIST OF FIGURES (cont)


| Figure Nr | | Page |
|---|---|---|
| | Regression Plot, High Rate Hydrostatic Tensile | |
| 21 | Strain at Maximum Stress | 38 |
| 22 | Maximum Stress | 39 |
| 23 | Strain at Rupture | 40 |
| 24 | Stress at Rupture | 41 |
| 25 | Modulus | 42 |
| 26 | Regression Plot, Tear Energy | 44 |
| | Regression Plot, Stress Relaxation, .5% Strain, -65°F | |
| 27 | Modulus at 10 sec | 46 |
| 28 | Modulus at 50 sec | 47 |
| 29 | Modulus at 100 sec | 49 |
| 30 | Modulus at 1000 sec | 50 |
| | Regression Plot, Stress Relaxation, .5% Strain, -40°F | |
| 31 | Modulus at 10 sec | 52 |
| 32 | Modulus at 50 sec | 53 |
| 33 | Modulus at 100 sec | 54 |
| 34 | Modulus at 1000 sec | 55 |
| | Regression Plot, Stress Relaxation, 3% Strain, 20°F | |
| 35 | Modulus at 10 sec | 57 |
| 36 | Modulus at 50 sec | 58 |
| 37 | Modulus at 100 sec | 59 |
| 38 | Modulus at 1000 sec | 60 |
| | Regression Plot, Stress Relaxation, 3% Strain, 77°F | |
| 39 | Modulus at 10 sec | 62 |

LIST OF FIGURES (cont)


| Figure Nr | | Page |
|---|---|---|
| | Regression Plot, Stress Relaxation, 3% Strain 77°F | |
| 40 | Modulus at 50 sec | 63 |
| 41 | Modulus at 100 sec | 64 |
| 42 | Modulus at 1000 sec | 65 |
| | Regression Plot, Stress Relaxation, 3% Strain, 100°F | |
| 43 | Modulus at 10 sec | 67 |
| 44 | Modulus at 50 sec | 68 |
| 45 | Modulus at 100 sec | 69 |
| 46 | Modulus at 1000 sec | 70 |
| | Regression Plot, Stress Relaxation, 3% Strain 140°F | |
| 47 | Modulus at 10 sec | 72 |
| 48 | Modulus at 50 sec | 73 |
| 49 | Modulus at 100 sec | 74 |
| 50 | Modulus at 1000 sec | 75 |
| | Regression Plot, Stress Relaxation, 3% Strain, 180°F | |
| 51 | Modulus at 10 sec | 77 |
| 52 | Modulus at 50 sec | 78 |
| 53 | Modulus at 100 sec | 79 |
| 54 | Modulus at 100 sec | 80 |
| | Regression Plot, Sol Gel | |
| 55 | Density | 82 |
| 56 | Percent Extractables | 83 |
| 57 | Gel Swell Ratio | 84 |
| 58 | Crosslink Density | 86 |

LIST OF FIGURES (cont)


| Figure | | Page |
|---|---|---|
| 59 | Regression Plot, Constant Strain | 88 |
| 60 | Regression Plot, Hardness | 90 |
| | Regression Plot, Pressure Time | |
| 61 | Maximum Pressure | 92 |
| 62 | Time to Maximum Pressure | 93 |
| | Regression Plot, TCLE | |
| 63 | TCLE Above $T_g$ | 95 |
| 64 | TCLE Below $T_g$ | 96 |
| | Regression Plot, TGA, 9°C rise/min | |
| 65 | Ignition Temperature | 98 |
| 66 | Percent Weight Loss at 250° Hold | 100 |
| 67 | Percent Weight Loss at Ignition | 102 |
| | Regression Plot, DTA, 12°C rise/min | |
| 68 | Endotherm | 104 |
| 69 | Exotherm 1 | 105 |
| 70 | Exotherm 2 | 107 |
| 71 | Exotherm 3 | 109 |
| 72 | Ignition Temperature | 111 |
| 73 | Regression Plot, Burning Rate, 1000 psi | 113 |
| | Regression Plot, DSC | |
| 74 | Endotherm | 115 |
| 75 | Exotherm 1 | 116 |
| 76 | Exotherm 2 | 117 |

## LIST OF REFERENCES

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|---|---|---|
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| 29D | Zero Time Test Results (Aft Closure) | 9 Jun 64 |
| 29E | Zero Time (Aft Closure Supplement 1) | 24 Jun 64 |
| 29F | ATP Phase I Test Results | 30 Mar 65 |
| 29G | ATP Phase I Test Results | 19 Aug 65 |
| 29H | ATP Phase I Test Results | 10 Sep 65 |
| 32A | Zero Time, Wings II-V Test Results | 17 Mar 65 |
| 32B | Zero Time, Wings II-V Test Results (Aft Closure) | 18 Mar 65 |
| 32C | ATP Phase I, Wings II-V Test Results | 3 Nov 65 |
| 49 | ATP Phase I, Wings II-V (First Group) | 18 Mar 66 |
| 53 | ATP Phase I, Wings II-V (Second Group) | 22 Apr 66 |
| 55 | ATP Phase I, Wings II-V (Third Group) | 29 Apr 66 |
| 58 | ATP Phase I, Wings II-V (Fourth Group) | 6 May 66 |
| 61 | ATP Phase I, Wings II-V (Fifth Group) | 10 Jun 66 |
| 66 | ATP Phase I, Wings II-V (Sixth Group) | 22 Jul 66 |
| 76 | ATP Phase II, Wing I Test Results | 24 Jan 67 |
| 78 | Zero Time, Wing VI Test Results | 3 Feb 67 |
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*LIST OF REFERENCES (CONT)*

| Report Nr | Title | Report Date |
|---|---|---|
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| 162 | ATP Phase I, Wing VI (Second Group) | 30 Sep 69 |
| 176 | ATP Phase II, Wing VI (First Group) | 15 Apr 70 |
| 181 | ATP Phase III, Wing I | 7 May 70 |
| 185 | ATP Phase I, Wing VI (Third Group) | 22 Jun 70 |
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| 239 | Surveillance Report LGM-30 Stage I (TP-H1011 and TP-H1043) | Apr 72 |
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| 271 | Surveillance Report LGM-30 F & G Stage I Phase A Series II, (TP-H1011) | Jul 73 |
| 277 | Surveillance Report LGM-30 F & G Stage I Phase A Series III, (TP-H1011) | Oct 73 |
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| 319 | Propellant Surveillance Report LGM-30 Dissected Motors, Phase VI, TP-H1011 | Apr 75 |
| 321 | Propellant Surveillance Report LGM-30 F & G Stage 1, Phase B, Series II, TP-H1011 | Apr 75 |
| 325 | Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011 | Jun 75 |
| 328 | Propellant Surveillance Report LGM-30 A & B Stage 1, TP-H1011 | Sep 75 |
| 330 | Propellant Surveillance Report LGM-30 F & G Stage 1, TP-H1011 | Oct 75 |
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| 337 | Propellant Surveillance Report LGM-30 A & B, Stage 1, TP-H1043 | Feb 76 |
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| Report Nr | Title | Report Date |
|---|---|---|
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| 425 | Propellant Surveillance Report LGM-30 A and B Stage I, TP-H1011 | Nov 79 |
| 427 | Propellant Surveillance Report LGM-30 Dissected Motors, Phase XI, TP-H1011 | Nov 79 |

## GLOSSARY OF TERMS AND ABBREVIATIONS

| | |
|---|---|
| Aging Trend | A change in properties or performance resulting from aging of material or component |
| CSA | Cross Sectional Area |
| DB | Dogbone |
| Degradation | Gradual deterioration of properties or performance |
| E | Modulus (psi), defined as stress divided by strain along the initial linear portion of the curve. |
| EB | End Bonded |
| EGL | Effective Gage Length |
| em | Strain at maximum stress |
| er | Strain at rupture |
| "F" ratio | The ratio of the variance accounted for by the regression function to the random unexplained variance. The regression function having the most significant "F" ratio is used for plotting data. The ratio is also used in detecting significant changes in random variation between succeeding time points |
| JANNAF | Joint Army, Navy, NASA, Air Force Committee |
| MANCP | Propellant Lab Section at Ogden Air Logistics Center |
| Ogden ALC | Ogden Air Logistics Center, Air Force Logistics Command |
| r or R | The Correlation Coefficient is a measure of the degree of closeness of the linear relationship between two variables |
| Linear Regression Equation | The general form of the linear regression equation is $Y = a + bx$ |
| Regression Line | Line representing mean test values with respect to time |
| $S_b$ | Standard error of estimate of the regression coefficient |

GLOSSARY OF TERMS AND ABBREVIATIONS (cont)

| | |
|---|---|
| $S_e$ or $S_{Y.X}$ | Standard deviation of the data about the regression line |
| Sm | Maximum Stress |
| Sr | Stress at rupture |
| Standard Deviation ($S_y$) | Square root of variance |
| Strain Rate | Crosshead speed divided by the EGL |
| "t" test | A statistical test used to detect significant differences between a measured parameter and an expected value of the parameter (determines if regression slope differs from zero at the 95% confidence level) |
| Variance | The sum of squares of deviations of the test results from the mean of the series after division by one less than the total number of test results |
| 3 Sigma Band | The area between the upper and lower 3 sigma limit. It can be expected that 99.73% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed. |
| 90-90 Band | It can be stated with 90% confidence that 90% of the inventory represented by the test samples would fall within this range assuming that the population is normally distributed |
| Significant | As used in the statistical sense, means a difference unlikely to have been the result of random sampling from some specified population. |

# INTRODUCTION

## A. PURPOSE:

Laboratory testing has been performed for fourteen years on First Stage LGM-30 F and G Minuteman Motor propellant blocks to evaluate the effects of aging on TP-H1011 propellant. This report contains those tests conducted on propellant as instructed in MMWRM Test Directive GTD-1C, Amendment 2, LGM-30 First Stage Operational Propellant Laboratory Testing.

Statistical analysis of the data from tests performed will provide early warning if serious degradation trends develop. Annual evaluation of the propellant provides data for input into engineering reliability analysis for service life predictions.

## B. BACKGROUND:

LGM-30 F and G testing was started in 1966 with phase testing at 24 month intervals (Report Numbers 78 - zero time; 104, 162, 185-Phase I: 176, 239, 257-Phase II; 271-Phase III). Report Number 257 was the first time that LGM-30 F and G data were statistically analyzed separately from LGM-30A and B data. The present report is a continuation of testing and statistical analysis.

Zero time testing for LGM-30A, B, F and G was started as soon as possible after receipt of the propellant by MAKPH. Data from these tests were used to establish a base line for each test parameter.

The LGM-30F and G propellant test matrix (Table 1) is used to determine the number of specimens to be taken from each propellant loaf and the specific test or tests to which these specimens are to be subjected. Very low rate and low rate tensile specimens are taken on all LGM-30F and G blocks. Specimens for other physical and combustion tests are taken from every third (LGM-30F and G) block.

TABLE 1

SAMPLE PLAN

The Procedure for determining tests to be performed on propellant batch samples of LGM-30 F & G First Stage Motors are as follows:

1. Divide the USAF motor serial numbers into three groups by dividing the last three digits of each serial number by three to determine the remainder integer, e.g., 154 ÷ 3 = 51 with a remainder integer of 1.

2. Use the remainder integer to enter the following matrix to determine the group of tests to be performed on the forward, middle, and aft batch samples associated with a particular motor serial number.

GROUP MATRIX

| TP-H1011 PROPELLANT BATCH SAMPLE | GROUP I | GROUP II | GROUP III |
|---|---|---|---|
| Forward | 1 | 2 | 0 |
| Middle | 0 | 1 | 2 |
| Aft | 2 | 0 | 1 |

Each group will receive the following tests:

TEST MATRIX

| GROUP I | GROUP II | GROUP III |
|---|---|---|
| High Rate Triaxial | Dynamic Response | High Rate Hydrostatic |
| Creep | Stress Relaxation | Sol Gel |
| Biaxial Low Rate | Burning Rate | DSC |
| TCLE | Heat of Explosion | TGA |
| Hardness | Pressure Time | DTA |
| Ignitability | | Impact |

NOTE: Low Rate and Very Low Rate Tensile tests are performed on all blocks.

## STATISTICAL APPROACH

In order to determine aging trends for shelf/service life predictions, as directed by Service Engineering, First Stage LGM-30 F and G Minuteman TP-H1011 propellant blocks have been undergoing testing since 1966, statistically analyzed and reported on a regular test cycle by this laboratory.

The primary reason for performing statistical analysis on test data is for the detection of propellant changes due to aging that would affect motor reliability. Regression analysis was the method used to examine data and to aid in drawing conclusions about dependency relationships that may exist i.e., relationship between age versus test results.

In selecting the best fit model for the regression equation, the linear model $Y = a + bX$ was found to be the best fit model for the regression plots.

Individual data points from different time periods were used to establish a least squares trend line for the data. The variance about the regression line, obtained using individual values of the dependent variable, was used to compute a tolerance interval such that at the 90% confidence level 90% of the sample distribution falls within this interval. This tolerance interval was extrapolated to a maximum of 24 months into the future from age of the oldest motor tested. The 't' value and the significance of this statistic, which are reported for each regression model, give an indication of the "statistical significance" of the slope of the trend line as compared to a line of zero slope. When a regression slope is indicated to be significant, it should be noted that the slope of the regression line is significant from a statistical standpoint and it is an indication that a change over time is occurring, but does not necessarily mean that the indicated change in the

value obtained during testing is significant in regards to motor operational performance. In a few cases, this small change has become the apparent trend in data variance and regression line trends. However, the changes are gradual and no operational problems are expected at this time.

The data were plotted by computer. The 'y' axis is computed so that the values at one inch intervals are peculiar to the data spread of the parameter tested. Plotted data points represent means at the particular ages at which testing occurred. The number of specimens at each age point is indicated on the sample size summary sheet accompanying the regression plot. Variance at each test age can be determined by consulting the G085 data storage system.

## TEST RESULTS

### VERY LOW RATE TENSILE:

Very low rate regressions show a statistically significant decrease for strain at maximum stress and strain at rupture. The stresses and modulus show a statistically significant increase (Figures 1 thru 5). The trends are gradual for the respective regressions and no operational problems from the propellant are expected for at least two years beyond the last test data.

### LOW RATE BIAXIAL TENSILE:

The strain at maximum stress regression shows a statistically significant gradual increase with the strain at rupture showing no statistically significant change. The stresses and modulus show a statistically significant increase (Figures 6 thru 10).

### LOW RATE TENSILE:

Low rate tensile data regressions show a statistically significant gradual decrease for strains and a statistically significant increase for stresses and modulus (Figures 11 thru 15).

### HIGH RATE TRIAXIAL TENSILE:

The strain at maximum stress, strain at rupture and modulus regressions show a statistically significant decrease. Maximum stress shows a statistically significant increase. Stress at rupture does not show a significant change (Figures 16 thru 20).

### HIGH RATE HYDROSTATIC TENSILE:

The strains show a statistically significant decrease. The stresses and modulus show a statistically significant increase (Figures 21 thru 25).

TEAR ENERGY:

The cohesive energy shows a statistically significant decrease (Figure 26).

TENSILE SUMMARY:

The test data regressions show that the strain is gradually decreasing and the stress and modulus gradually increasing.

Based on the analysis of test data regressions, it does not appear that meaningful degradation is occurring at this time and no operational problems are expected in the propellant for at least two years beyond the last data point.

STRESS RELAXATION MODULUS:

For the 0.5% strain at -65°F, the regressions for data at 10, 50, 100, and 1000 seconds show a statistically significant gradual increase. (Figures 27 thru 30).

At -40°F, the 10, 50, and 100 second regressions show a statistically significant increase. The 1000 second regression shows no statistically significant change. (Figures 31 thru 34).

The 3% strain regressions at 20°F, 77°F, 100°F, and 180°F show a statistically significant gradual increase. (Figures 35 thru 54).

SOL GEL:

The percent extractables, density and gel swell ratio do not show a significant change. The crosslink density regression shows a statistically significant increase (Figures 55 thru 58).

CONSTANT STRAIN:

A statistically significant gradual decrease is shown for constant strain (Figure 59).

HARDNESS:

Shore A ten second hardness shows a statistically significant increase (Figure 60).

SUMMARY OF SOL GEL, TENSILE AND HARDNESS DATA:

The crosslink density, constant strain and hardness data regressions correlate with the tensile data. As the polymer continues to crosslink, the strains decrease and the stresses increases.

PRESSURE TIME:

Maximum pressure shows no significant change while time to maximum pressure shows a statistically significant gradual decrease (Figures 61 and 62).

TCLE (Thermal Coefficient of Linear Expansion):

The thermal coefficient of linear expansion for both above and below the glass transition point (Tg) shows a statistically significant gradual increase (Figures 63 and 64).

TGA (Thermal Gravimetric Analysis):

A statistically significant increase is shows for the ignition temperature (9°C rise/min), the percent weight loss at 250°C hold (12°C rise/min to hold) and the weight loss at ignition (Figures 65 thru 67).

DTA (Differential Thermal Analysis):

The endotherm and first and second exotherms show a statistically significant decrease. The third exotherm shows a statistically significant increase and the ignition temperature with no significant change (Figures 68 thru 72).

BURNING RATE:

The burning rate shows a statistically significant gradual increase (Figure 73).

DIFFERENTIAL SCANNING CALORIMETER:

The endotherm and first and second exotherms shows a statistically significant decrease. (Figures 74 thru 76).

THERMAL AND COMBUSTION SUMMARY:

The time to maximum pressure from the pressure time data and burning rate data show a correlation. In both cases, the regressions show a gradual increase in rate of reaction. The maximum pressure and DSC regressions also correlate well with each other. In both cases, a gradual decrease in energy is shown.

The ignition temperatures for TGA shows a gradual increase.

From the analyses of the regressions, no combustion problems are expected for at least two years beyond the oldest data point.

## CONCLUSIONS

Fourteen years of aging at ambient temperature (77°F) has not greatly changed the properties of the propellant. Some test parameters indicate slight aging trends, but nothing that would adversely affect the operational characteristics of the rocket motor propellant.

From the statistical analysis, it does not appear that a significant propellant degradation is occurring. Based on fourteen years of accumulated data, there is no reason to suspect that properties will show much change for at least two years past the last data point. Therefore, propellant reliability should not change appreciably over that time period. Since failure limits are not available for the parameters tested, this statement is based on the fact that the slope of the regression curves where statistically significant are, with few exceptions, relatively flat or close to the line of zero slope and have not changed appreciably from the last test period.

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 3 | 33 | 152 | 58 | 352 | 83 | 80 | 108 | 93 | 133 | 79 |
| 9 | 19 | 34 | 154 | 59 | 317 | 84 | 56 | 109 | 120 | 134 | 117 |
| 10 | 11 | 35 | 113 | 60 | 418 | 85 | 76 | 110 | 57 | 135 | 60 |
| 11 | 15 | 36 | 226 | 61 | 290 | 86 | 92 | 111 | 42 | 136 | 51 |
| 12 | 30 | 37 | 147 | 62 | 337 | 87 | 122 | 112 | 130 | 137 | 93 |
| 13 | 43 | 38 | 126 | 63 | 243 | 88 | 139 | 113 | 297 | 138 | 256 |
| 14 | 28 | 39 | 119 | 64 | 160 | 89 | 177 | 114 | 159 | 139 | 154 |
| 15 | 38 | 40 | 122 | 65 | 108 | 90 | 156 | 115 | 130 | 140 | 72 |
| 16 | 45 | 41 | 156 | 66 | 79 | 91 | 107 | 116 | 315 | 141 | 34 |
| 17 | 55 | 42 | 123 | 67 | 48 | 92 | 82 | 117 | 247 | 142 | 42 |
| 18 | 23 | 43 | 142 | 68 | 179 | 93 | 108 | 118 | 149 | 143 | 197 |
| 19 | 49 | 44 | 106 | 69 | 234 | 94 | 99 | 119 | 133 | 144 | 92 |
| 20 | 24 | 45 | 135 | 70 | 287 | 95 | 146 | 120 | 210 | 145 | 6 |
| 21 | 56 | 46 | 122 | 71 | 135 | 96 | 188 | 121 | 117 | 146 | 21 |
| 22 | 27 | 47 | 166 | 72 | 124 | 97 | 150 | 122 | 41 | 147 | 21 |
| 23 | 67 | 48 | 177 | 73 | 98 | 98 | 156 | 123 | 42 | 148 | 40 |
| 24 | 55 | 49 | 199 | 74 | 143 | 99 | 191 | 124 | 45 | 149 | 12 |
| 25 | 63 | 50 | 188 | 75 | 177 | 100 | 163 | 125 | 84 | 150 | 24 |
| 26 | 47 | 51 | 347 | 76 | 135 | 101 | 136 | 126 | 53 | 151 | 45 |
| 27 | 30 | 52 | 314 | 77 | 161 | 102 | 51 | 127 | 101 | 152 | 3 |
| 28 | 55 | 53 | 295 | 78 | 91 | 103 | 65 | 128 | 60 | 153 | 5 |
| 29 | 40 | 54 | 232 | 79 | 117 | 104 | 84 | 129 | 75 | 154 | 15 |
| 30 | 73 | 55 | 474 | 80 | 113 | 105 | 33 | 130 | 181 | 155 | 15 |
| 31 | 88 | 56 | 461 | 81 | 155 | 106 | 11 | 131 | 200 | 156 | 15 |
| 32 | 153 | 57 | 392 | 82 | 178 | 107 | 28 | 132 | 153 | 157 | 9 |
| | | | | | | | | | | 158 | 15 |
| | | | | | | | | | | 159 | 18 |
| | | | | | | | | | | 160 | 3 |
| | | | | | | | | | | 161 | 18 |
| | | | | | | | | | | 162 | 6 |
| | | | | | | | | | | 169 | 6 |

WING 6,V.L.S,TENSILE,STRAIN AT MAX STRESS,CHS=0.002 IN/MIN TR-H1011

This sample size summary is applicable to figures 1 thru 3

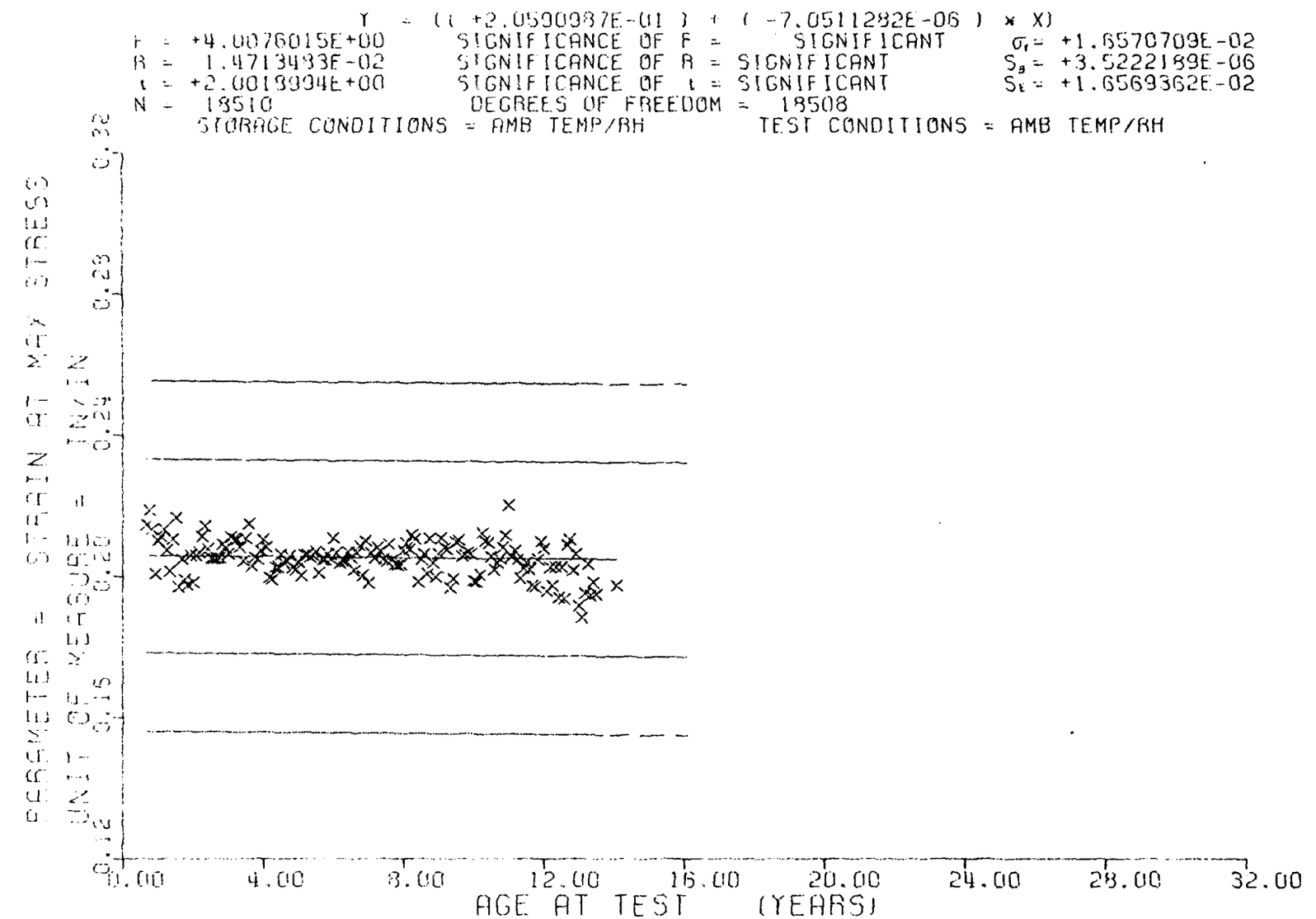

Y = ( +2.0500837E-01 ) + ( -7.0511282E-06 ) x X)
F = +4.0076015E+00 SIGNIFICANCE OF F = SIGNIFICANT σr = +1.6570709E-02
R = 1.4713433E-02 SIGNIFICANCE OF R = SIGNIFICANT Sa = +3.5222189E-06
t = +2.0018934E+00 SIGNIFICANCE OF t = SIGNIFICANT St = +1.6569362E-02
N = 18510 DEGREES OF FREEDOM = 18508
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = IN/IN
0.32
0.28
0.24
0.20
0.16
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6,V.L.B.TENSILE,STRAIN AT MAX STRESS,CHS=0.002 IN/MIN TP-H1011

Figure 1

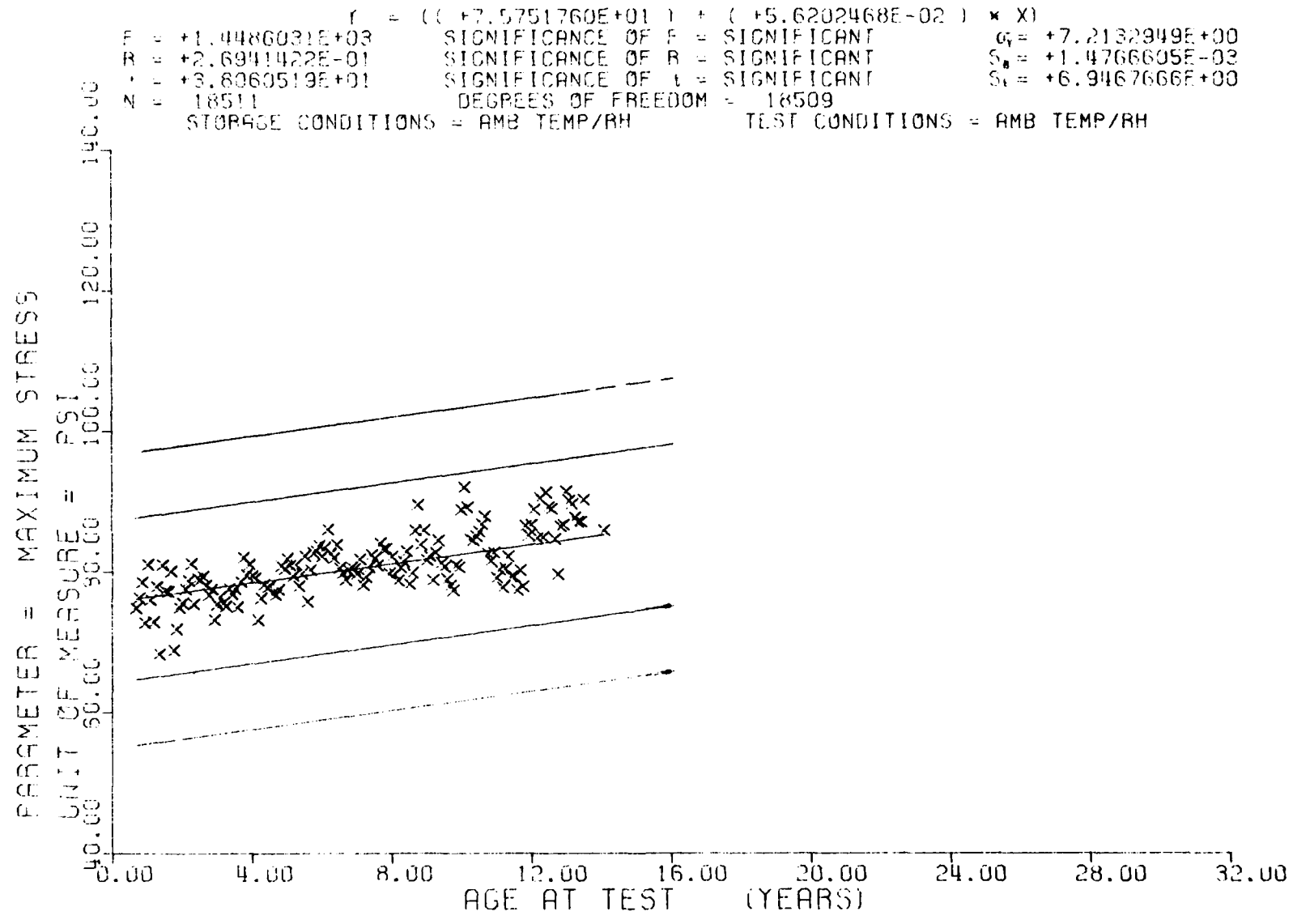

Y = (( +7.5751760E+01 ) + ( +5.6202468E-02 ) * X)
F = +1.4486031E+03 SIGNIFICANCE OF F = SIGNIFICANT σ = +7.2132949E+00
R = +2.6911422E-01 SIGNIFICANCE OF R = SIGNIFICANT S = +1.4766605E-03
t = +3.8060519E+01 SIGNIFICANCE OF t = SIGNIFICANT S = +6.9467666E+00
N = 18511 DEGREES OF FREEDOM = 18509
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI
40.00
60.00
80.00
100.00
120.00
140.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6,V.L.B.TENSILE,MAXIMUM STRESS,CHS-0.002 IN/MIN TP-H1011

Figure 2

Y = (( +2.2222657E-01 ) + ( -3.2085772E-05 ) * X)

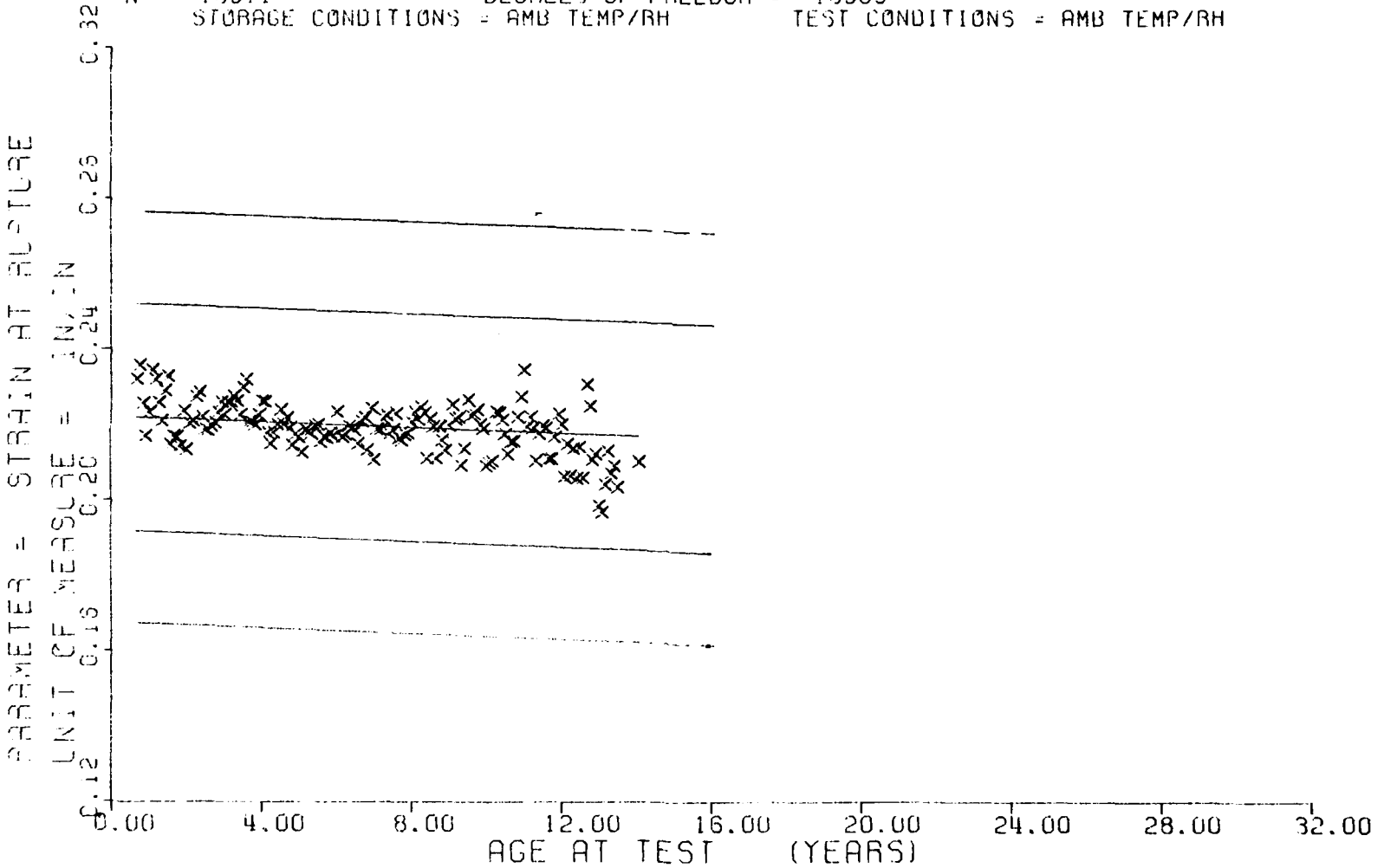
F = +6.8801816E+01 SIGNIFICANCE OF F = SIGNIFICANT $\sigma_1$ = +1.8230912E-02

R = -6.0855914E-02 SIGNIFICANCE OF R = SIGNIFICANT $S_a$ = +3.8682323E-06

t = +8.2946860E+00 SIGNIFICANCE OF t = SIGNIFICANT $S_\varepsilon$ = +1.8197614E-02

N = 18511 DEGREES OF FREEDOM = 18509

STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH




WING 6,V.L.R.TENSILE,STRAIN AT RUPTURE,CHS=0.002 IN/MIN TP-H1011

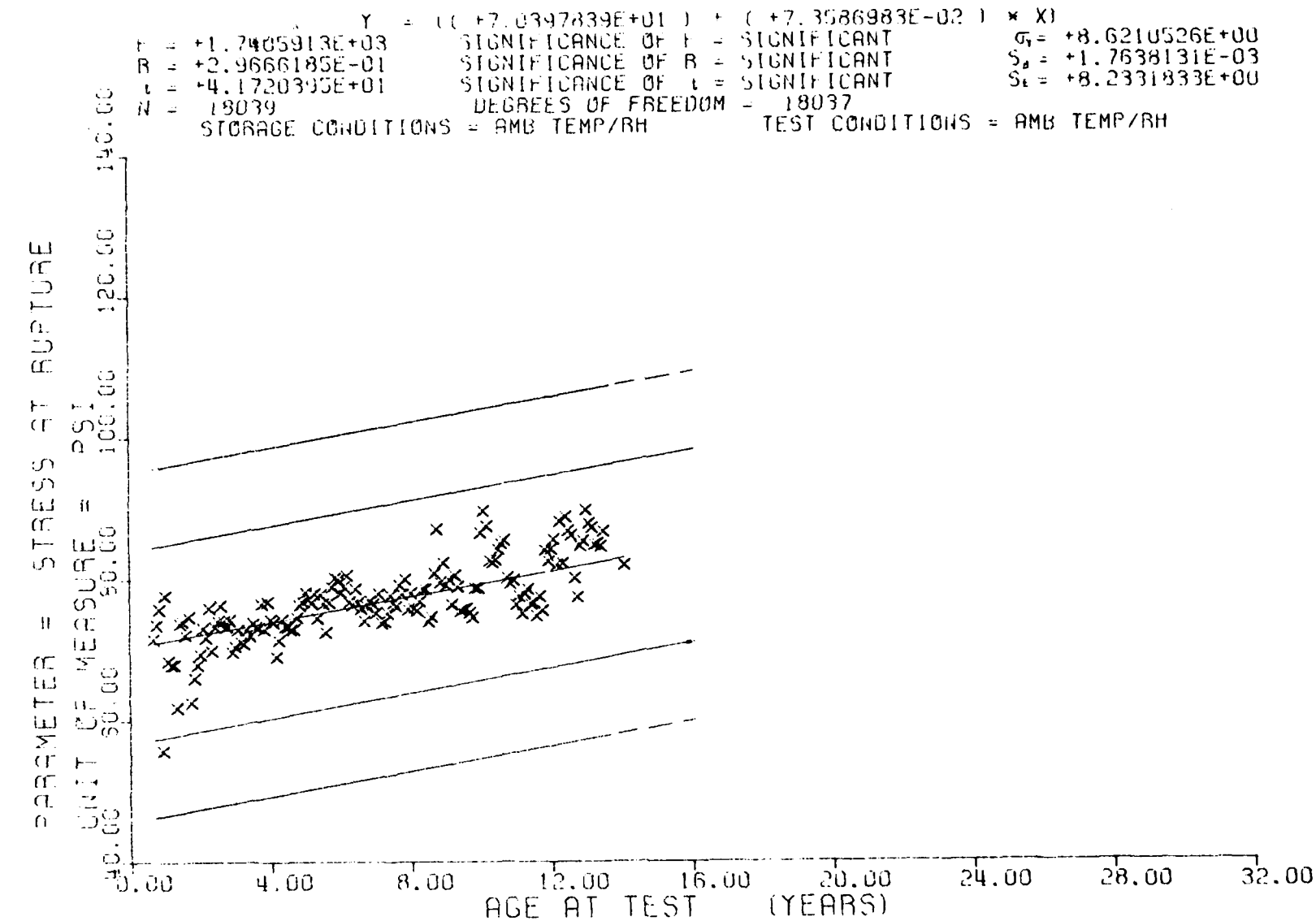
Figure 3

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 1 | 33 | 140 | 58 | 276 | 83 | 80 | 108 | 93 | 133 | 79 |
| 9 | 19 | 34 | 139 | 59 | 250 | 84 | 56 | 109 | 120 | 134 | 117 |
| 10 | 11 | 35 | 110 | 60 | 330 | 85 | 76 | 110 | 57 | 135 | 60 |
| 11 | 15 | 36 | 216 | 61 | 240 | 86 | 91 | 111 | 42 | 136 | 51 |
| 12 | 30 | 37 | 138 | 62 | 307 | 87 | 122 | 112 | 130 | 137 | 93 |
| 13 | 43 | 38 | 111 | 63 | 220 | 88 | 139 | 113 | 297 | 138 | 256 |
| 14 | 28 | 39 | 110 | 64 | 156 | 89 | 177 | 114 | 160 | 139 | 154 |
| 15 | 38 | 40 | 116 | 65 | 108 | 90 | 156 | 115 | 130 | 140 | 72 |
| 16 | 46 | 41 | 149 | 66 | 79 | 91 | 107 | 116 | 315 | 141 | 34 |
| 17 | 55 | 42 | 115 | 67 | 48 | 92 | 82 | 117 | 247 | 142 | 42 |
| 18 | 28 | 43 | 120 | 68 | 179 | 93 | 108 | 118 | 149 | 143 | 197 |
| 19 | 49 | 44 | 103 | 69 | 234 | 94 | 99 | 119 | 133 | 144 | 92 |
| 20 | 24 | 45 | 135 | 70 | 288 | 95 | 146 | 120 | 210 | 145 | 6 |
| 21 | 56 | 46 | 122 | 71 | 135 | 96 | 188 | 121 | 117 | 146 | 21 |
| 22 | 27 | 47 | 166 | 72 | 124 | 97 | 150 | 122 | 41 | 147 | 21 |
| 23 | 67 | 48 | 177 | 73 | 98 | 98 | 156 | 123 | 42 | 148 | 40 |
| 24 | 55 | 49 | 199 | 74 | 143 | 99 | 191 | 124 | 45 | 149 | 12 |
| 25 | 53 | 50 | 188 | 75 | 177 | 100 | 163 | 125 | 84 | 150 | 24 |
| 26 | 47 | 51 | 347 | 76 | 135 | 101 | 136 | 126 | 53 | 151 | 45 |
| 27 | 50 | 52 | 314 | 77 | 161 | 102 | 51 | 127 | 101 | 152 | 3 |
| 28 | 56 | 53 | 295 | 78 | 91 | 103 | 65 | 128 | 60 | 153 | 5 |
| 29 | 40 | 54 | 232 | 79 | 117 | 104 | 84 | 129 | 75 | 154 | 15 |
| 30 | 73 | 55 | 474 | 80 | 113 | 105 | 33 | 130 | 181 | 155 | 15 |
| 31 | 62 | 56 | 461 | 81 | 155 | 106 | 11 | 131 | 200 | 156 | 15 |
| 32 | 143 | 57 | 382 | 82 | 178 | 107 | 28 | 132 | 153 | 157 | 9 |
| | | | | | | | | | | 158 | 15 |
| | | | | | | | | | | 159 | 18 |
| | | | | | | | | | | 160 | 3 |
| | | | | | | | | | | 161 | 18 |
| | | | | | | | | | | 162 | 6 |
| | | | | | | | | | | 169 | 6 |

WING 6,V,L.R.TENSILE,STRESS AT RUPTURE,CHS=0.002 IN/MIN TP-H1011

This sample size summary is applicable to figure 4




WING 6,V.L.B.TENSILE,STRESS AT RUPTURE,CHS-0.002 IN/MIN TP-H1011

Figure 4

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 3 | 33 | 152 | 58 | 352 | 83 | 80 | 108 | 93 | 133 | 79 |
| 9 | 19 | 34 | 154 | 59 | 344 | 84 | 56 | 109 | 120 | 134 | 117 |
| 10 | 11 | 35 | 113 | 60 | 442 | 85 | 76 | 110 | 57 | 135 | 60 |
| 11 | 15 | 36 | 226 | 61 | 294 | 86 | 91 | 111 | 42 | 136 | 51 |
| 12 | 30 | 37 | 147 | 62 | 342 | 87 | 122 | 112 | 130 | 137 | 93 |
| 13 | 48 | 38 | 126 | 63 | 259 | 88 | 138 | 113 | 297 | 138 | 256 |
| 14 | 29 | 39 | 119 | 64 | 160 | 89 | 177 | 114 | 160 | 139 | 154 |
| 15 | 35 | 40 | 122 | 65 | 105 | 90 | 156 | 115 | 130 | 140 | 72 |
| 16 | 46 | 41 | 156 | 66 | 79 | 91 | 107 | 116 | 315 | 141 | 34 |
| 17 | 55 | 42 | 123 | 67 | 47 | 92 | 82 | 117 | 247 | 142 | 42 |
| 18 | 28 | 43 | 142 | 68 | 174 | 93 | 108 | 118 | 149 | 143 | 197 |
| 19 | 39 | 44 | 108 | 69 | 234 | 94 | 99 | 119 | 133 | 144 | 92 |
| 20 | 24 | 45 | 135 | 70 | 287 | 95 | 145 | 120 | 192 | 145 | 6 |
| 21 | 56 | 46 | 122 | 71 | 138 | 96 | 188 | 121 | 102 | 146 | 21 |
| 22 | 27 | 47 | 166 | 72 | 121 | 97 | 150 | 122 | 41 | 147 | 21 |
| 23 | 87 | 48 | 177 | 73 | 98 | 98 | 156 | 123 | 42 | 148 | 40 |
| 24 | 55 | 49 | 199 | 74 | 143 | 99 | 191 | 124 | 45 | 149 | 12 |
| 25 | 63 | 50 | 188 | 75 | 177 | 100 | 163 | 125 | 84 | 150 | 24 |
| 26 | 47 | 51 | 347 | 76 | 135 | 101 | 136 | 126 | 53 | 151 | 45 |
| 27 | 50 | 52 | 314 | 77 | 161 | 102 | 51 | 127 | 101 | 152 | 3 |
| 28 | 57 | 53 | 295 | 78 | 89 | 103 | 65 | 128 | 60 | 153 | 5 |
| 29 | 40 | 54 | 232 | 79 | 117 | 104 | 84 | 129 | 75 | 154 | 15 |
| 30 | 73 | 55 | 474 | 80 | 113 | 105 | 33 | 130 | 181 | 155 | 15 |
| 31 | 89 | 56 | 403 | 81 | 155 | 106 | 11 | 131 | 200 | 156 | 15 |
| 32 | 153 | 57 | 390 | 82 | 178 | 107 | 28 | 132 | 153 | 157 | 9 |
| | | | | | | | | | | 158 | 15 |
| | | | | | | | | | | 159 | 18 |
| | | | | | | | | | | 160 | 3 |
| | | | | | | | | | | 161 | 18 |
| | | | | | | | | | | 162 | 6 |
| | | | | | | | | | | 169 | 6 |

MPG 6,V.L.R.TENSILE,MODULUS,CHS=0.002 IN/MIN TR-81011

This sample size summary is applicable to figure 5

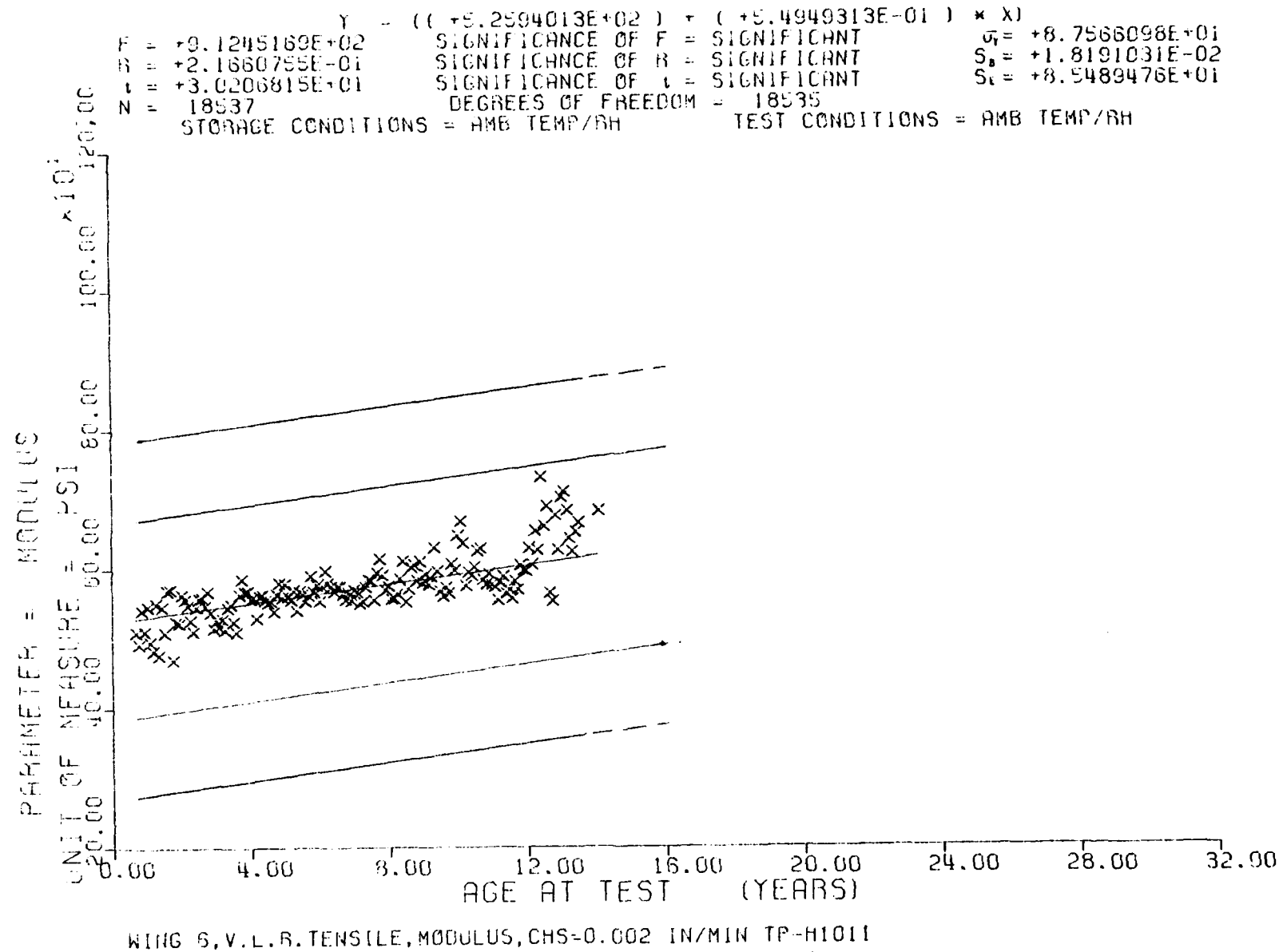

Y = (( +5.2594013E+02 ) + ( +5.4949313E-01 ) * X)
F = +9.1245169E+02
SIGNIFICANCE OF F = SIGNIFICANT
σr = +8.7566098E+01
R = +2.1660755E-01
SIGNIFICANCE OF R = SIGNIFICANT
Sb = +1.8191031E-02
t = +3.0206815E+01
SIGNIFICANCE OF t = SIGNIFICANT
Sε = +8.5489476E+01
N = 18537
DEGREES OF FREEDOM = 18535
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI
x10³
120.00
100.00
80.00
60.00
40.00
20.00
0.00
4.00
8.00
12.00
16.00
20.00
24.00
28.00
32.00
AGE AT TEST (YEARS)
WING 6,V.L.R.TENSILE,MODULUS,CHS-0.002 IN/MIN TP-H1011

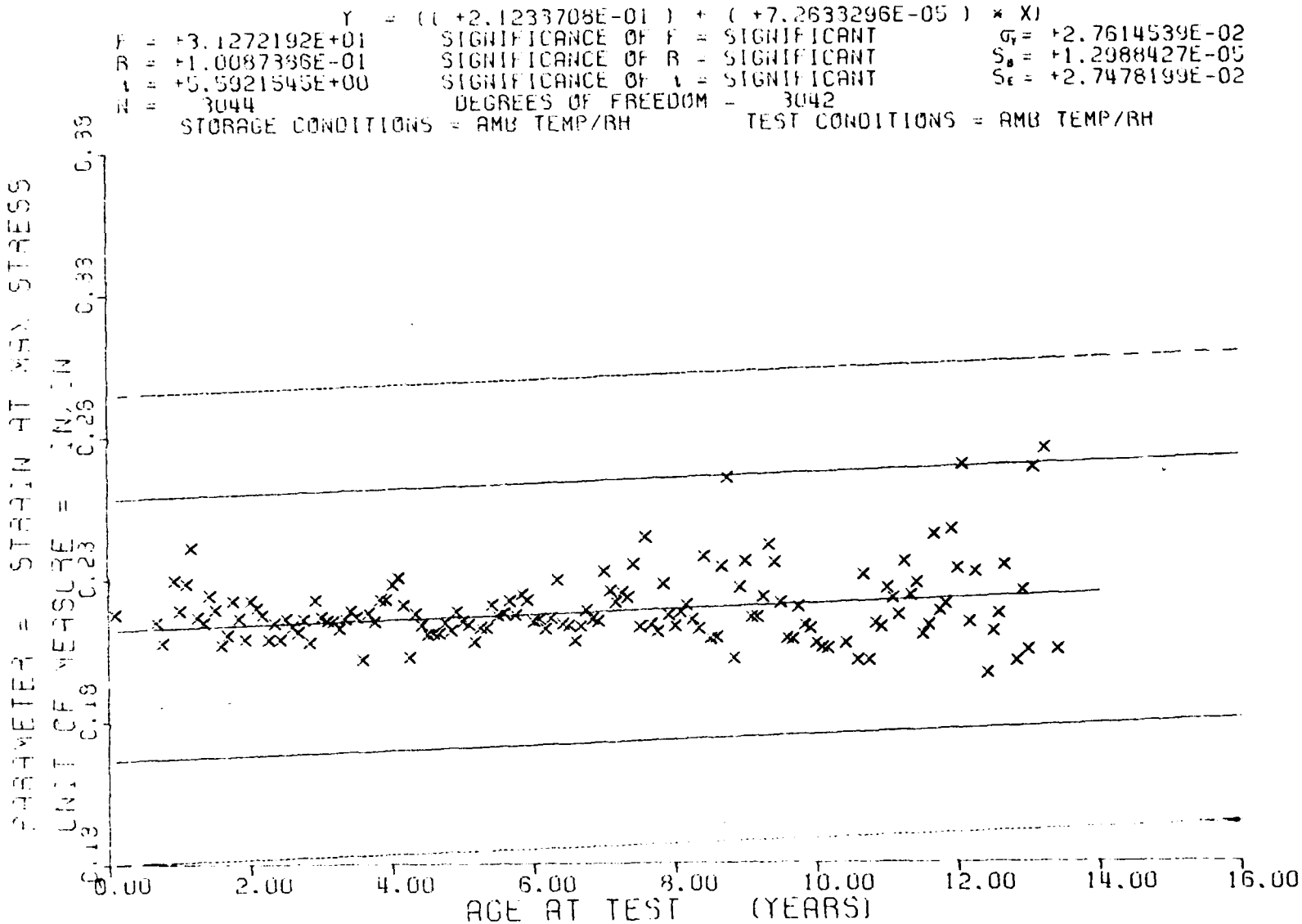
Figure 5

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 33 | 22 | 58 | 40 | 83 | 16 | 108 | 14 | 135 | 18 |
| 3 | 2 | 34 | 26 | 59 | 31 | 84 | 10 | 109 | 22 | 136 | 2 |
| 4 | 4 | 35 | 26 | 60 | 45 | 85 | 6 | 110 | 25 | 137 | 17 |
| 11 | 6 | 36 | 34 | 61 | 35 | 86 | 7 | 111 | 10 | 138 | 60 |
| 12 | 11 | 37 | 14 | 62 | 57 | 87 | 8 | 112 | 10 | 139 | 36 |
| 13 | 22 | 38 | 11 | 63 | 54 | 88 | 10 | 113 | 15 | 140 | 8 |
| 14 | 4 | 39 | 28 | 64 | 42 | 89 | 8 | 114 | 66 | 141 | 8 |
| 15 | 16 | 40 | 16 | 65 | 18 | 90 | 6 | 115 | 19 | 142 | 6 |
| 16 | 12 | 41 | 14 | 66 | 27 | 91 | 15 | 116 | 48 | 143 | 24 |
| 17 | 14 | 42 | 8 | 67 | 32 | 92 | 10 | 117 | 68 | 144 | 41 |
| 18 | 10 | 43 | 2 | 68 | 32 | 93 | 10 | 118 | 32 | 145 | 4 |
| 19 | 14 | 44 | 5 | 69 | 34 | 94 | 29 | 119 | 32 | 146 | 8 |
| 20 | 16 | 45 | 4 | 70 | 43 | 95 | 27 | 120 | 44 | 147 | 2 |
| 21 | 12 | 46 | 10 | 71 | 17 | 96 | 30 | 121 | 32 | 148 | 4 |
| 22 | 10 | 47 | 16 | 72 | 16 | 97 | 37 | 122 | 8 | 149 | 6 |
| 23 | 13 | 48 | 24 | 73 | 24 | 98 | 53 | 123 | 4 | 150 | 6 |
| 24 | 16 | 49 | 34 | 74 | 20 | 99 | 40 | 125 | 10 | 151 | 4 |
| 25 | 25 | 50 | 24 | 75 | 35 | 100 | 18 | 127 | 10 | 152 | 5 |
| 26 | 22 | 51 | 34 | 76 | 14 | 101 | 14 | 128 | 5 | 153 | 2 |
| 27 | 24 | 52 | 49 | 77 | 19 | 102 | 8 | 129 | 6 | 154 | 2 |
| 28 | 29 | 53 | 41 | 78 | 22 | 103 | 3 | 130 | 24 | 155 | 2 |
| 29 | 33 | 54 | 20 | 79 | 20 | 104 | 14 | 131 | 78 | 156 | 2 |
| 30 | 26 | 55 | 32 | 80 | 17 | 105 | 4 | 132 | 24 | 157 | 10 |
| 31 | 26 | 56 | 36 | 81 | 29 | 106 | 6 | 133 | 12 | 159 | 4 |
| 32 | 42 | 57 | 40 | 82 | 24 | 107 | 2 | 134 | 19 | 160 | 4 |
| | | | | | | | | | | 161 | 2 |
| | | | | | | | | | | 166 | 2 |
| | | | | | | | | | | 168 | 2 |

WING 6,L.E.BIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS=0.2 IN/MIN TPH=1011

This sample size summary is applicable to figures 6 thru 10




WING 6,L.R.BIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS=0.2 IN/MIN TPH-1011

Figure 6

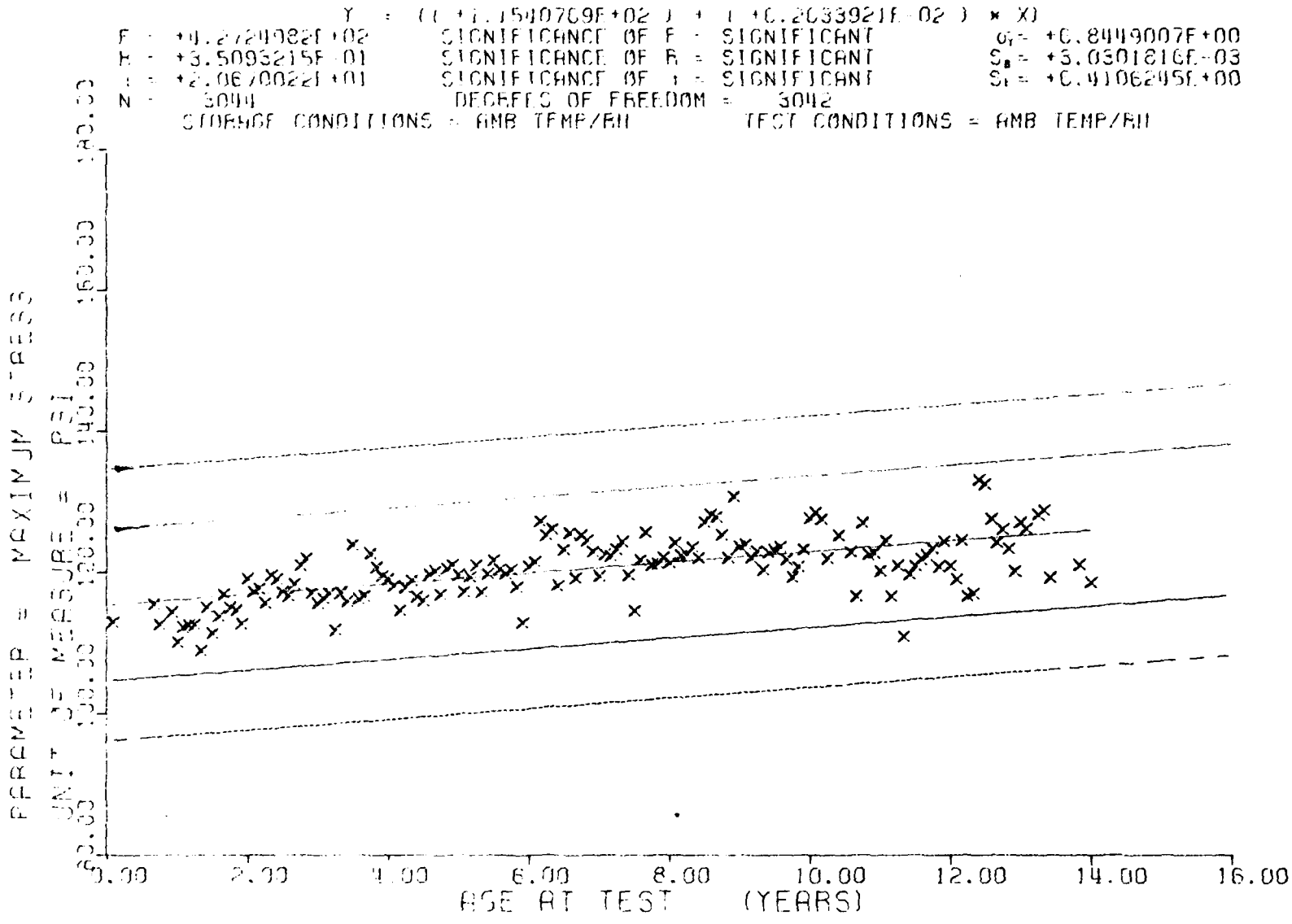

Y = ( +1.1540709E+02 ) + ( +0.2033921E-02 ) * X)
F = +9.2724982E+02 SIGNIFICANCE OF F = SIGNIFICANT σ = +0.8449007E+00
B = +3.5093215E-01 SIGNIFICANCE OF B = SIGNIFICANT S_B = +3.0301816E-03
t = +2.0670022E+01 SIGNIFICANCE OF t = SIGNIFICANT S_t = +0.4106245E+00
N = 3044 DEGREES OF FREEDOM = 3042
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI
160.00
140.00
120.00
100.00
80.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
MINS G,L.R.BIAXIAL TENSILE,MAXIMUM STRESS,CHS=0.2 IN/MIN TPH-1011

Figure 7

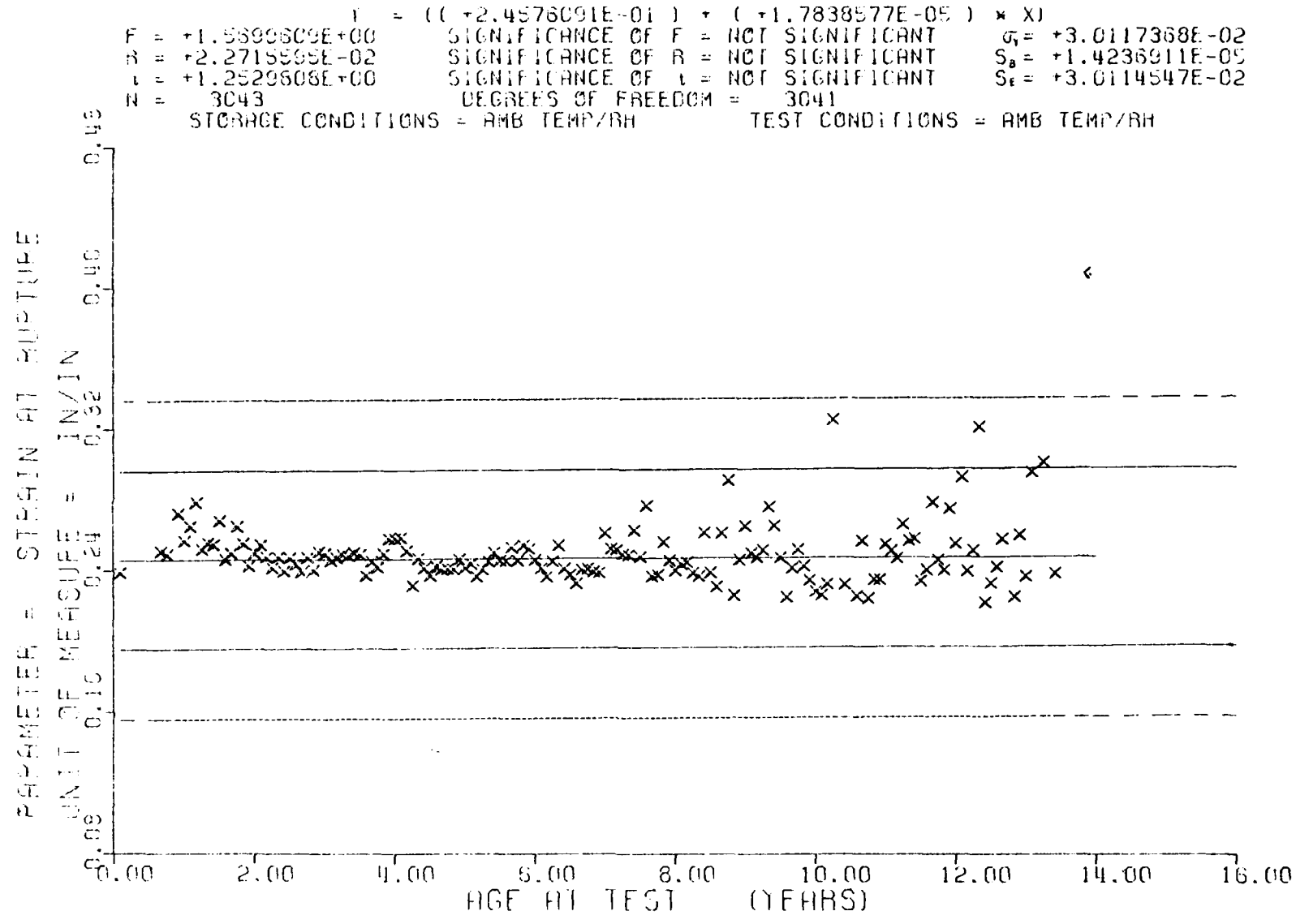

Y = (( +2.4576091E-01 ) + ( +1.7838577E-05 ) * XJ
F = +1.5899869E+00 SIGNIFICANCE OF F = NOT SIGNIFICANT σ1 = +3.0117368E-02
R = +2.2715595E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT Sβ = +1.4236911E-05
t = +1.2529608E+00 SIGNIFICANCE OF t = NOT SIGNIFICANT Sε = +3.0114547E-02
N = 3043 DEGREES OF FREEDOM = 3041
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = IN/IN
0.00
0.08
0.16
0.24
0.32
0.40
0.48
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING S,L,R,BIAXIAL TENSILE,STRAIN AT RUPTURE,CHS=0.2 IN/MIN TPH-1011

Figure 8

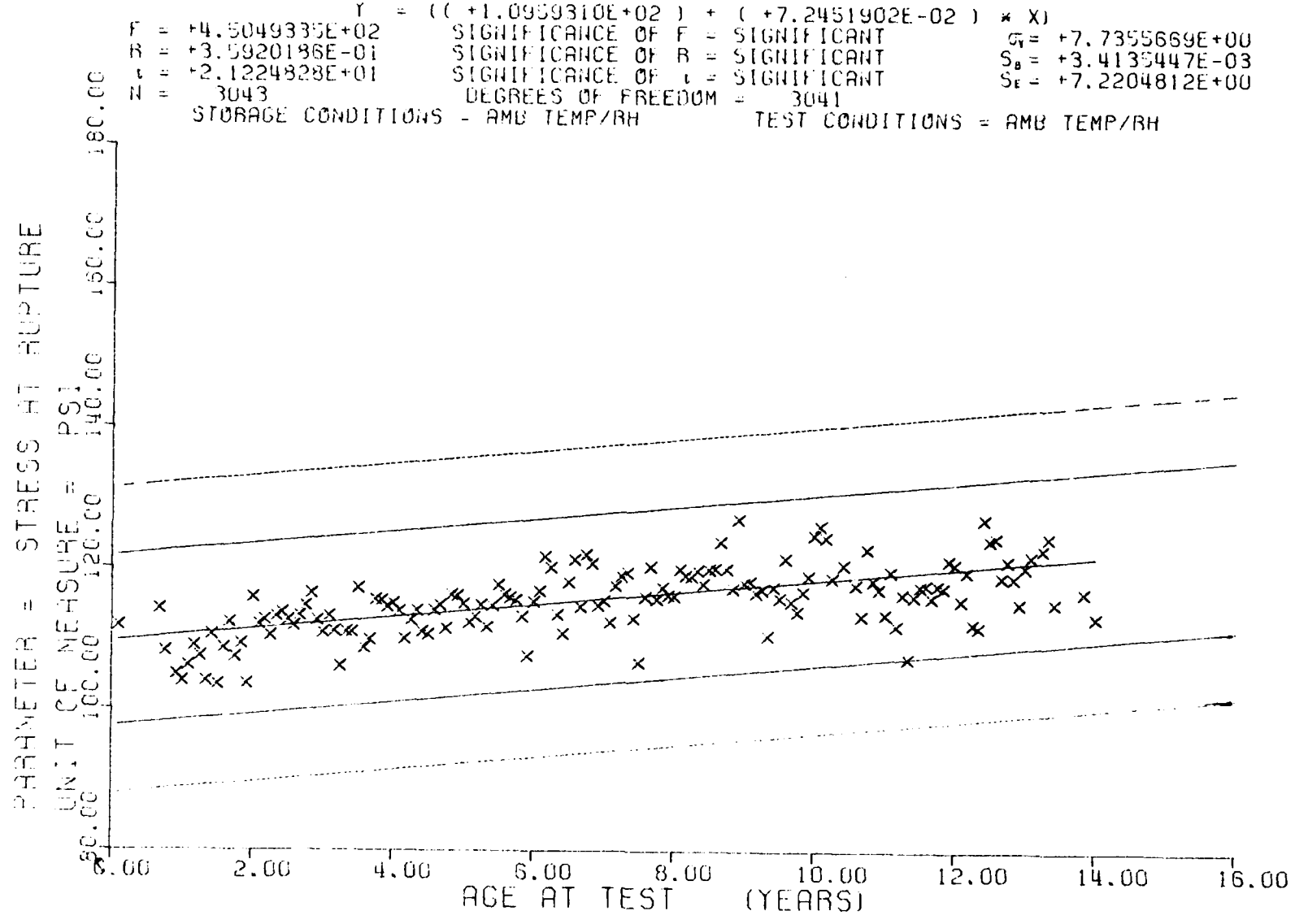

Y = (( +1.0959310E+02 ) + ( +7.2451902E-02 ) * X)
F = +4.5049335E+02
R = +3.5920186E-01
t = +2.1224828E+01
N = 3043
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 3041
$\sigma_t$ = +7.7355669E+00
$S_a$ = +3.4135447E-03
$S_E$ = +7.2204812E+00
STORAGE CONDITIONS - AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI
80.00
100.00
120.00
140.00
160.00
180.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING G,L,R,BIAXIAL TENSILE,STRESS AT RUPTURE,CHS=0.2 IN/MIN TPH-1011

Figure 9

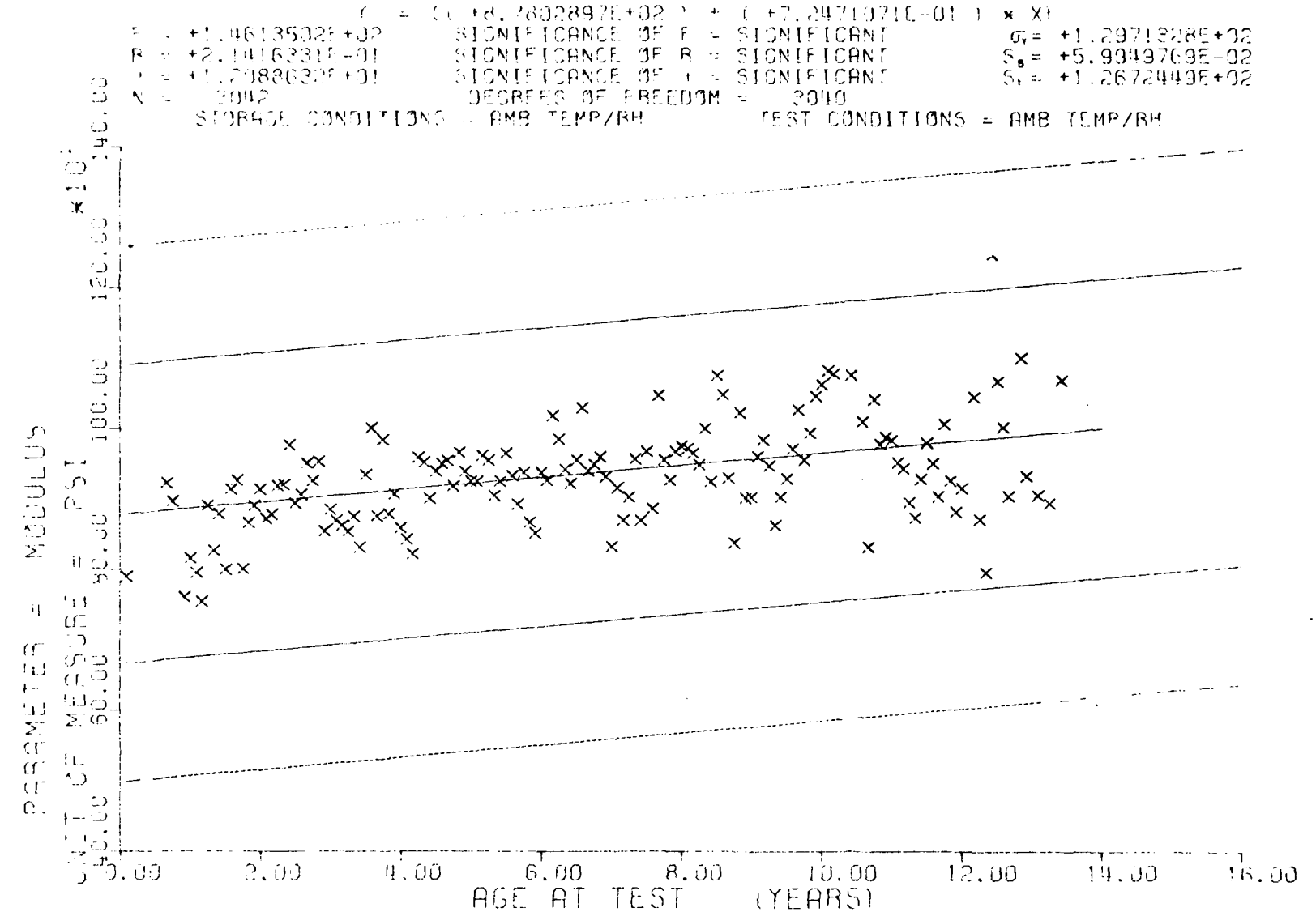

Y = ( +8.2802897E+02 ) + ( +7.2471071E-01 ) * X1
F = +1.4613502E+02 SIGNIFICANCE OF F = SIGNIFICANT σ = +1.2971328E+02
R = +2.1416231E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +5.9849709E-02
t = +1.2088032E+01 SIGNIFICANCE OF t = SIGNIFICANT Sy = +1.2672449E+02
N = 3042 DEGREES OF FREEDOM = 3040
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MODULUS
UNIT OF MEASURE = PSI
*10^3
140.00
120.00
100.00
80.00
60.00
40.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6,L.E.BIAXIAL TENSILE,MODULUS,CHS=0.2 IN/MIN TPH-1011

Figure 10

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | Age (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 3 | 28 | 82 | 53 | 97 | 78 | 177 | 103 | 53 | 128 | 74 | 153 | 6 |
| 4 | 97 | 29 | 55 | 54 | 83 | 79 | 129 | 104 | 81 | 129 | 51 | 154 | 18 |
| 5 | 151 | 30 | 52 | 55 | 143 | 80 | 132 | 105 | 18 | 130 | 261 | 155 | 24 |
| 6 | 191 | 31 | 52 | 56 | 108 | 81 | 179 | 106 | 15 | 131 | 141 | 156 | 18 |
| 7 | 171 | 32 | 124 | 57 | 172 | 82 | 94 | 107 | 27 | 132 | 55 | 157 | 15 |
| 8 | 143 | 33 | 85 | 58 | 158 | 83 | 100 | 108 | 111 | 133 | 63 | 158 | 15 |
| 9 | 194 | 34 | 78 | 59 | 134 | 84 | 75 | 109 | 109 | [illegible] | 102 | 159 | 12 |
| 10 | 189 | 35 | 44 | 60 | 159 | 85 | 83 | 110 | 62 | [illegible] | 47 | 160 | 12 |
| 11 | 192 | 36 | 154 | 61 | 189 | 86 | 60 | 111 | 33 | 136 | 45 | 161 | 18 |
| 12 | 220 | 37 | 83 | 62 | 218 | 87 | 153 | 112 | 96 | 137 | 93 | 165 | 3 |
| 13 | 213 | 38 | 39 | 63 | 283 | 88 | 143 | 113 | 120 | 138 | 267 | 168 | 12 |
| 14 | 222 | 39 | 93 | 64 | 134 | 89 | 150 | 114 | 73 | 139 | 153 | | |
| 15 | 223 | 40 | 65 | 65 | 75 | 90 | 117 | 115 | 77 | 140 | 40 | | |
| 16 | 212 | 41 | 35 | 66 | 61 | 91 | 94 | 116 | 270 | 141 | 38 | | |
| 17 | 124 | 42 | 69 | 67 | 104 | 92 | 80 | 117 | 261 | 142 | 84 | | |
| 18 | 26 | 43 | 75 | 68 | 110 | 93 | 81 | 118 | 161 | 143 | 220 | | |
| 19 | 60 | 44 | 21 | 69 | 154 | 94 | 131 | 119 | 117 | 144 | 27 | | |
| 20 | 18 | 45 | 20 | 70 | 188 | 95 | 136 | 120 | 253 | 145 | 18 | | |
| 21 | 78 | 46 | 58 | 71 | 102 | 96 | 228 | 121 | 115 | 146 | 39 | | |
| 22 | 43 | 47 | 106 | 72 | 145 | 97 | 242 | 122 | 38 | 147 | 12 | | |
| 23 | 30 | 48 | 85 | 73 | 153 | 98 | 226 | 123 | 40 | 148 | 18 | | |
| 24 | 77 | 49 | 122 | 74 | 172 | 99 | 147 | 124 | 42 | 149 | 23 | | |
| 25 | 51 | 50 | 108 | 75 | 241 | 100 | 65 | 125 | 60 | 150 | 38 | | |
| 26 | 56 | 51 | 175 | 76 | 158 | 101 | 103 | 126 | 78 | 151 | 17 | | |
| 27 | 59 | 52 | 223 | 77 | 154 | 102 | 22 | 127 | 59 | 152 | 9 | | |

[illegible] 6,L.E,TENSILE,STRAIN AT MAX STRESS,CHS=2.0 IN/MIN TP-H1011

This sample size summary is applicable to figures 11 thru 15

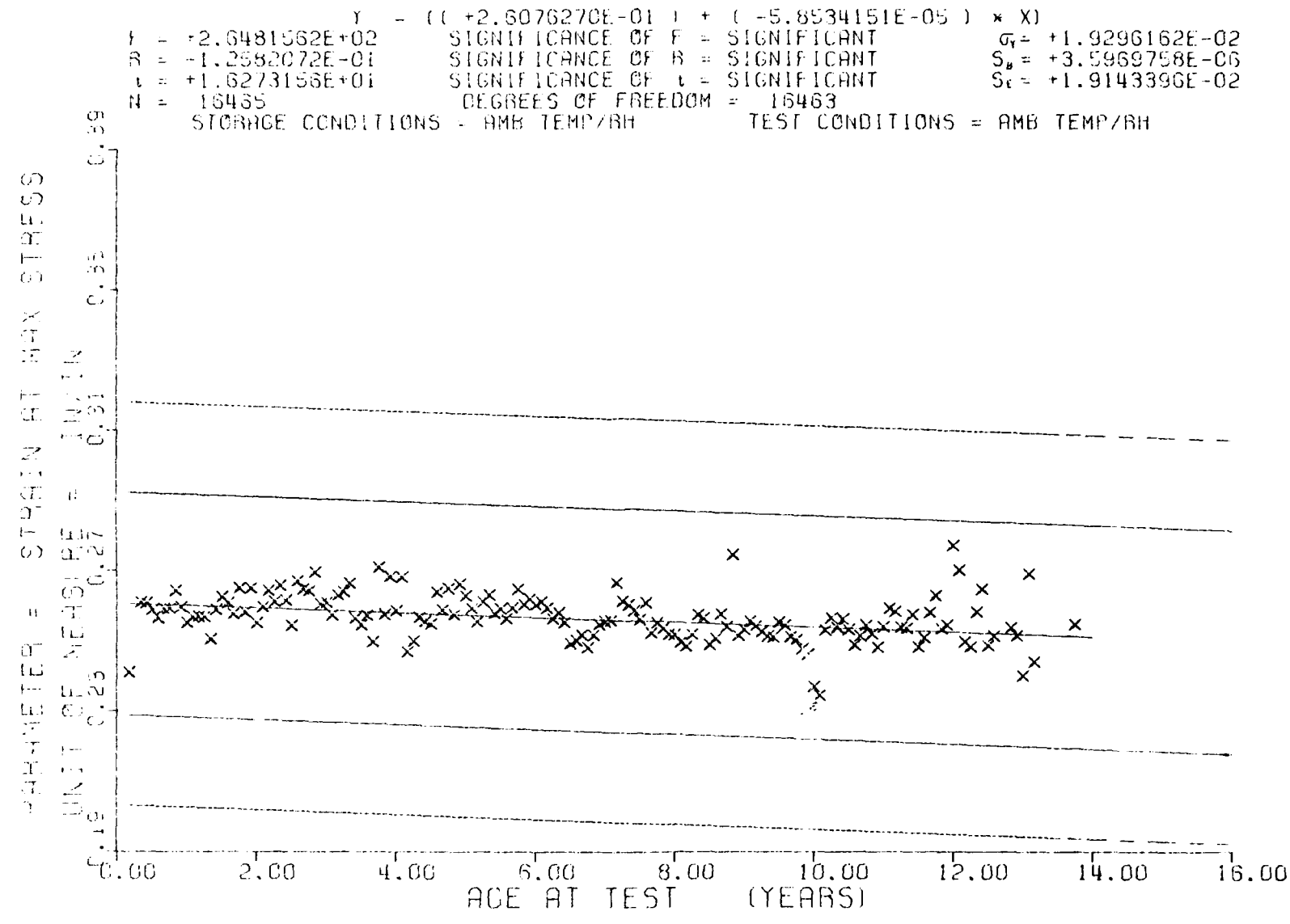

Y = (( +2.6076270E-01 ) + ( -5.8534151E-05 ) * X)
F = +2.6481562E+02 SIGNIFICANCE OF F = SIGNIFICANT σY = +1.9296162E-02
R = -1.2582072E-01 SIGNIFICANCE OF R = SIGNIFICANT SB = +3.5969758E-06
t = +1.6273156E+01 SIGNIFICANCE OF t = SIGNIFICANT SE = +1.9143396E-02
N = 16465 DEGREES OF FREEDOM = 16463
STORAGE CONDITIONS - AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = IN/IN
0.19
0.23
0.27
0.31
0.35
0.39
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING S,L.R.TENSILE,STRAIN AT MAX STRESS,CHS=2.0 IN/MIN TP-H1011

Figure 11

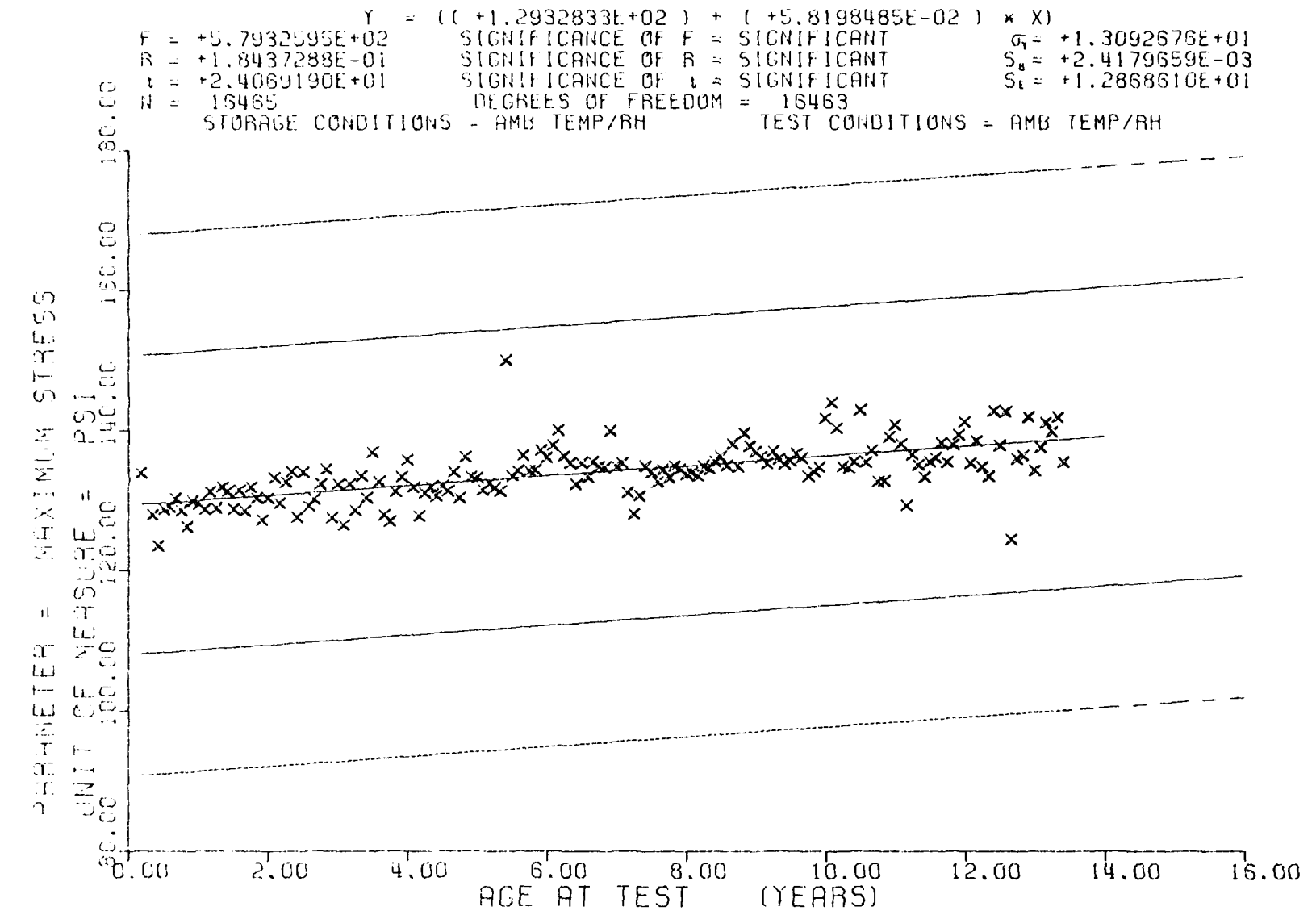
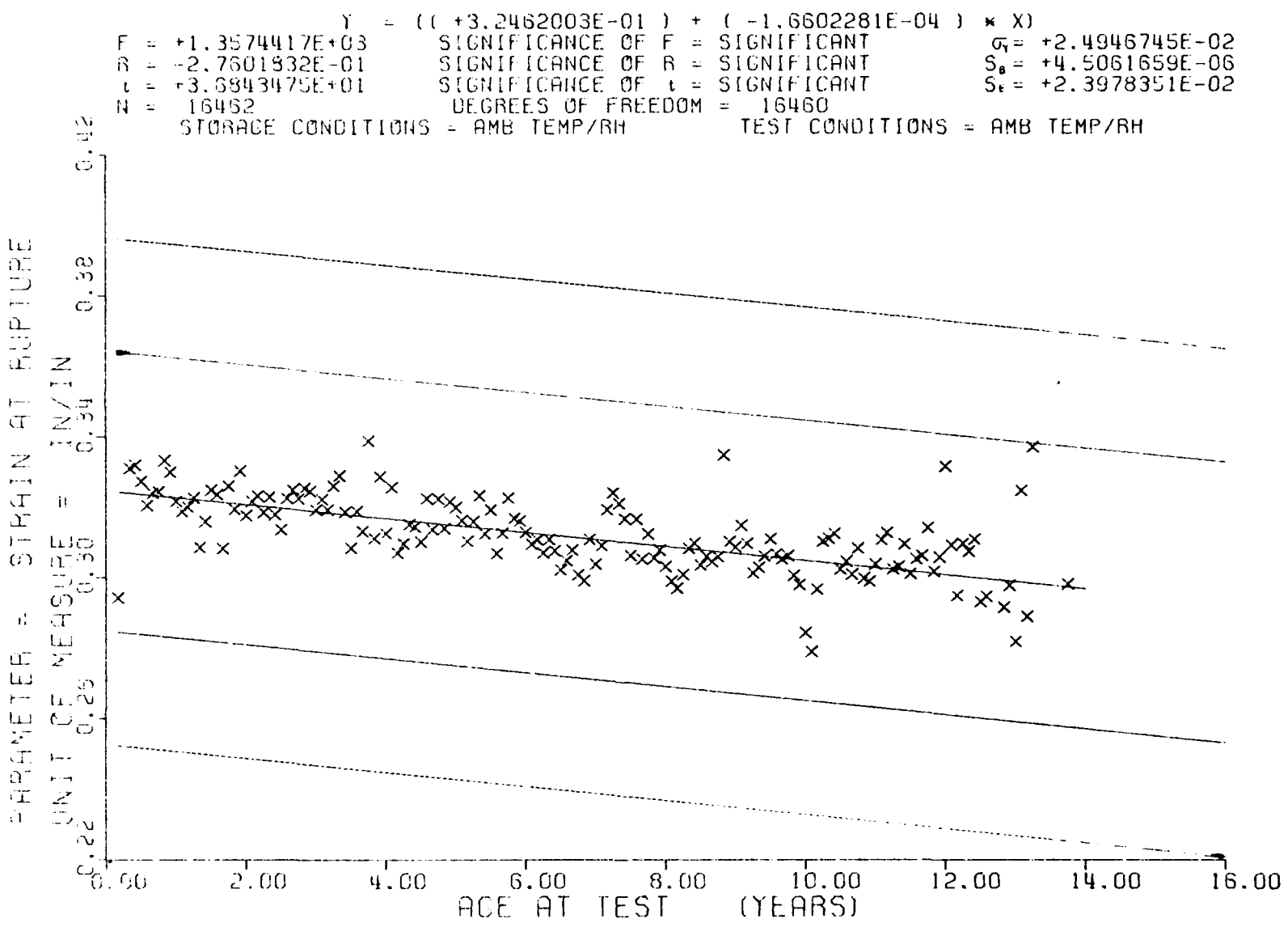
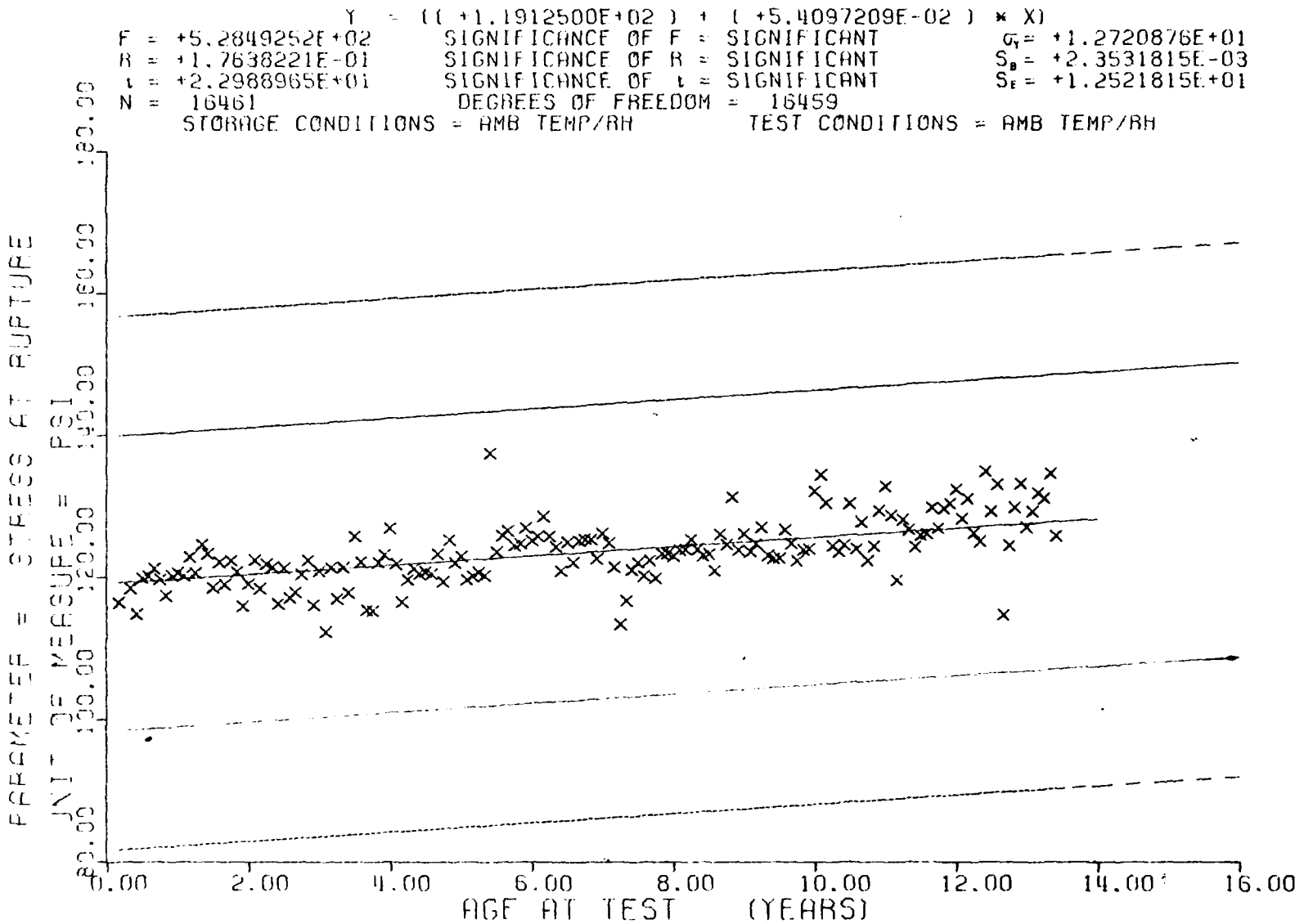

Y = (( +1.2932833E+02 ) + ( +5.8198485E-02 ) * X)
F = +5.7932595E+02 SIGNIFICANCE OF F = SIGNIFICANT
R = +1.8437288E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +2.4069190E+01 SIGNIFICANCE OF t = SIGNIFICANT
N = 16465 DEGREES OF FREEDOM = 16463
STORAGE CONDITIONS - AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI
80.00
100.00
120.00
140.00
160.00
180.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING S,L.R.TENSILE,MAXIMUM STRESS,CHS=2.0 IN/MIN TP-H1011

Figure 12

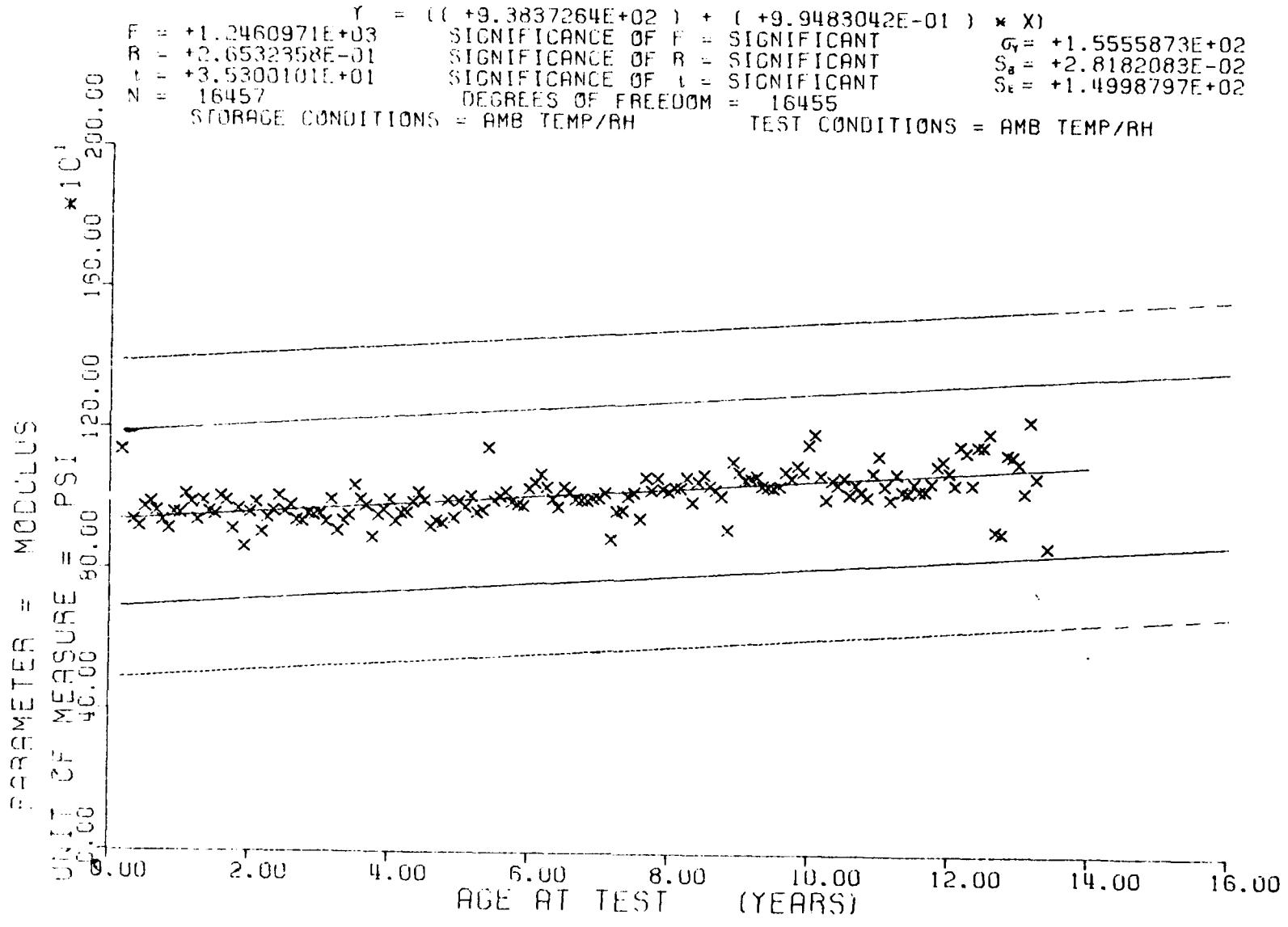



WING S,L.R.TENSILE,STRAIN AT RUPTURE,CHS=2.0 IN/MIN TP-H1011




WING G.L.R.TENSILE,STRESS AT RUPTURE,CHS=2.0 IN/MIN TP-H1011

Figure 14




WING 6,L.R.TENSILE,MODULUS,CHS=2.0 IN/MIN TP-H1011

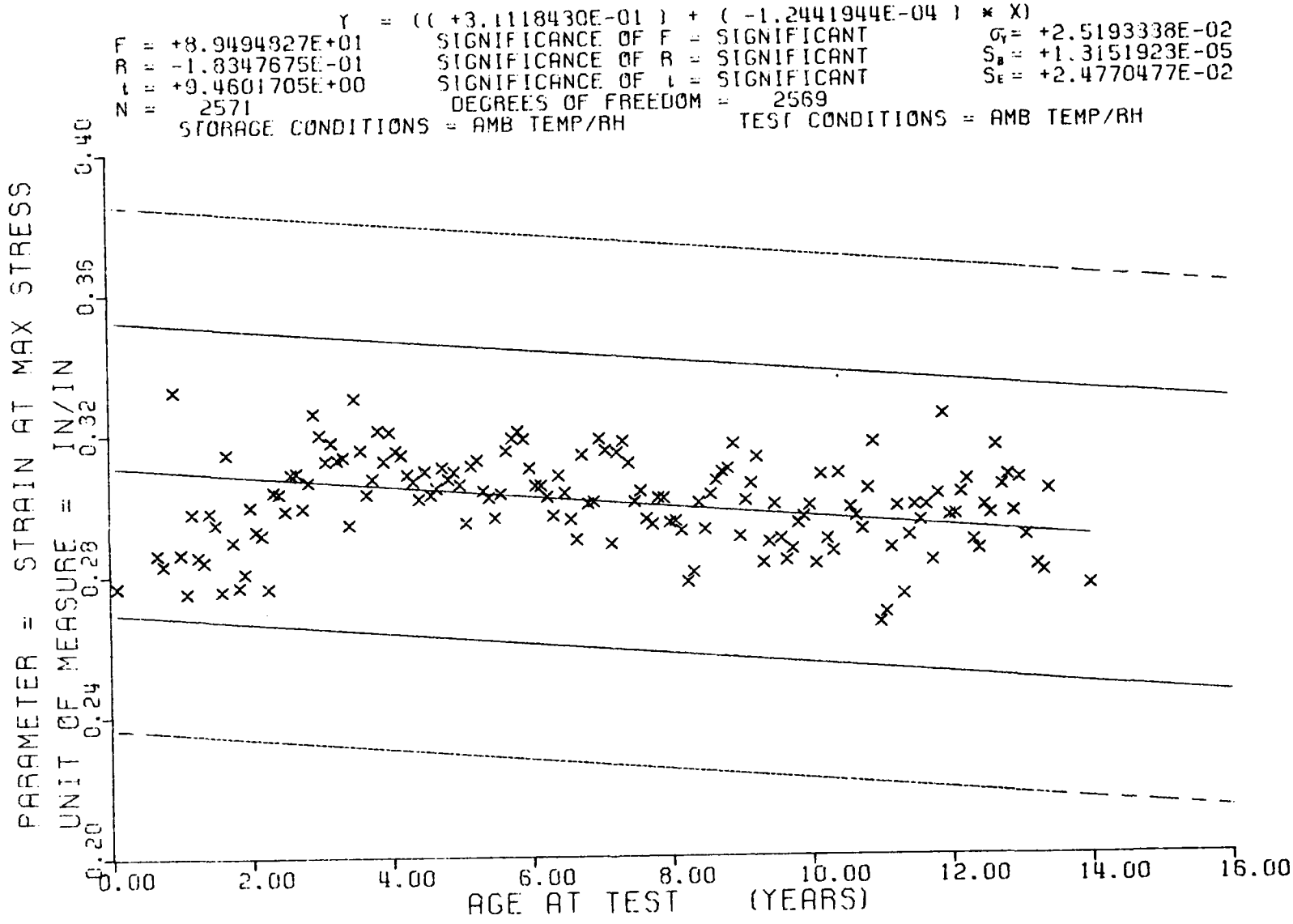
Figure 15

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 33 | 23 | 58 | 30 | 83 | 9 | 108 | 8 | 134 | 14 |
| 8 | 2 | 34 | 22 | 59 | 27 | 84 | 8 | 109 | 19 | 135 | 14 |
| 9 | 4 | 35 | 24 | 60 | 22 | 85 | 14 | 110 | 32 | 136 | 4 |
| 11 | 4 | 36 | 26 | 61 | 36 | 86 | 8 | 111 | 8 | 137 | 10 |
| 12 | 14 | 37 | 16 | 62 | 38 | 87 | 10 | 112 | 8 | 138 | 25 |
| 13 | 17 | 38 | 11 | 63 | 41 | 88 | 16 | 113 | 18 | 139 | 14 |
| 14 | 6 | 39 | 25 | 64 | 42 | 89 | 19 | 114 | 49 | 140 | 4 |
| 15 | 6 | 40 | 10 | 65 | 28 | 90 | 19 | 115 | 53 | 141 | 9 |
| 16 | 3 | 41 | 8 | 66 | 27 | 91 | 27 | 116 | 57 | 142 | 8 |
| 17 | 4 | 42 | 6 | 67 | 28 | 92 | 6 | 117 | 42 | 143 | 4 |
| 18 | 14 | 43 | 2 | 68 | 29 | 93 | 12 | 118 | 21 | 144 | 41 |
| 19 | 11 | 44 | 4 | 69 | 24 | 94 | 16 | 119 | 21 | 145 | 25 |
| 20 | 20 | 45 | 2 | 70 | 59 | 95 | 16 | 120 | 39 | 146 | 6 |
| 21 | 4 | 46 | 6 | 71 | 38 | 96 | 13 | 121 | 8 | 147 | 4 |
| 22 | 12 | 47 | 18 | 72 | 21 | 97 | 23 | 122 | 12 | 148 | 2 |
| 23 | 6 | 48 | 9 | 73 | 32 | 98 | 22 | 123 | 11 | 149 | 6 |
| 24 | 8 | 49 | 34 | 74 | 27 | 99 | 26 | 124 | 2 | 150 | 8 |
| 25 | 23 | 50 | 34 | 75 | 22 | 100 | 18 | 125 | 6 | 151 | 6 |
| 26 | 13 | 51 | 24 | 76 | 20 | 101 | 15 | 127 | 6 | 152 | 4 |
| 27 | 11 | 52 | 42 | 77 | 13 | 102 | 8 | 128 | 6 | 153 | 2 |
| 28 | 17 | 53 | 42 | 78 | 14 | 103 | 6 | 129 | 4 | 154 | 2 |
| 29 | 14 | 54 | 14 | 79 | 27 | 104 | 11 | 130 | 19 | 155 | 2 |
| 30 | 18 | 55 | 30 | 80 | 14 | 105 | 8 | 131 | 16 | 156 | 2 |
| 31 | 16 | 56 | 22 | 81 | 15 | 106 | 6 | 132 | 45 | 157 | 10 |
| 32 | 23 | 57 | 30 | 82 | 22 | 107 | 2 | 133 | 30 | 159 | 4 |
| | | | | | | | | | | 160 | 2 |
| | | | | | | | | | | 161 | 4 |
| | | | | | | | | | | 168 | 2 |

WING 6,H,R,TRIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS=1750 IN/MIN,800 PSI

This sample size summary is applicable to figures 16 thru 20




WING 6,H.B.TRIAXIAL TENSILE,STRAIN AT MAX STRESS,CHS=1750 IN/MIN,600 PSI

Figure 16

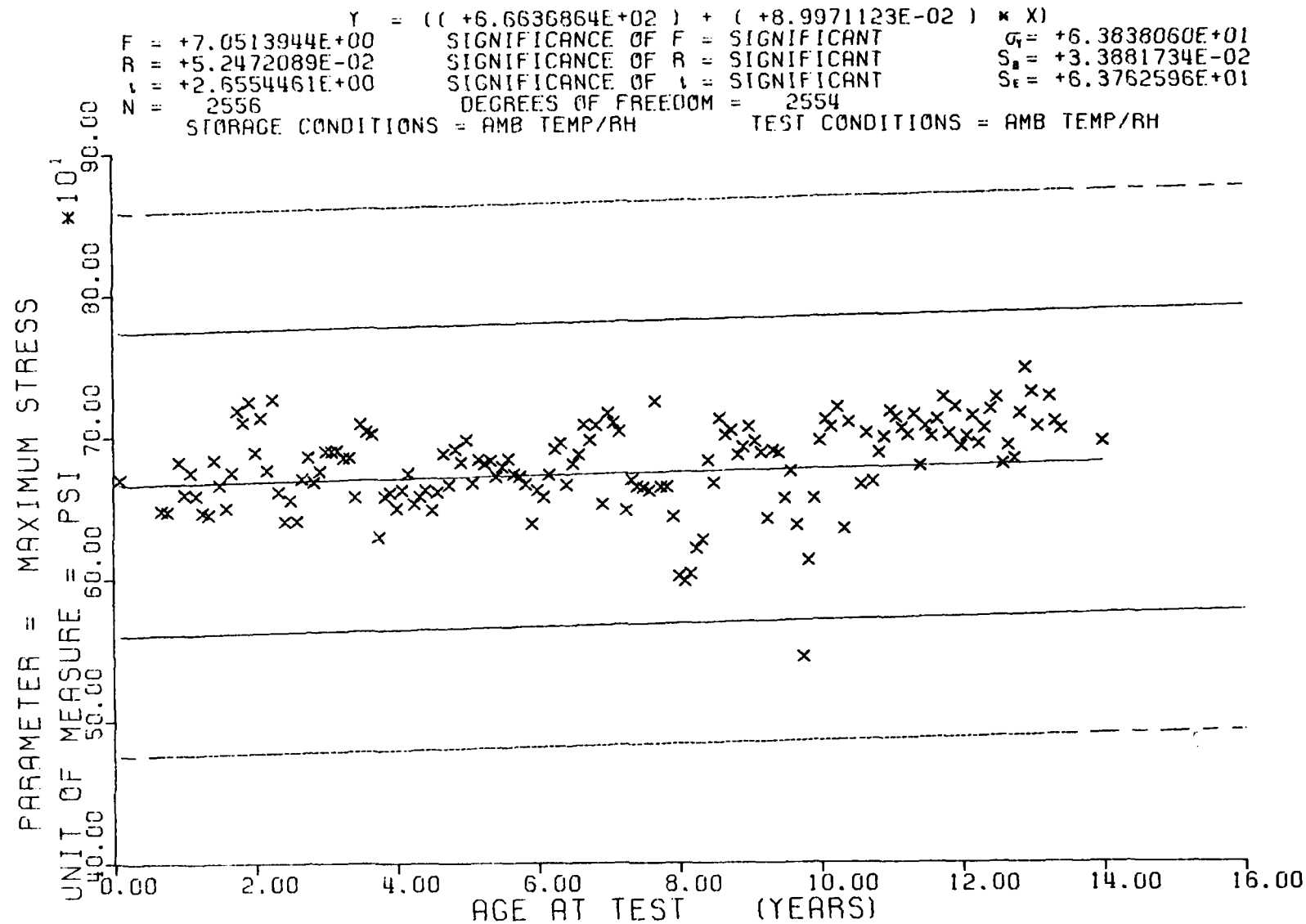

Y = (( +6.6636864E+02 ) + ( +8.9971123E-02 ) * X)
F = +7.0513944E+00 SIGNIFICANCE OF F = SIGNIFICANT σT = +6.3838060E+01
R = +5.2472089E-02 SIGNIFICANCE OF R = SIGNIFICANT Sa = +3.3881734E-02
ι = +2.6554461E+00 SIGNIFICANCE OF ι = SIGNIFICANT Sε = +6.3762596E+01
N = 2556 DEGREES OF FREEDOM = 2554
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI *10¹
90.00
80.00
70.00
60.00
50.00
40.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6,H.R.TRIAXIAL TENSILE,MAXIMUM STRESS,CHS=1750 IN/MIN, 800 PSI

Figure 17

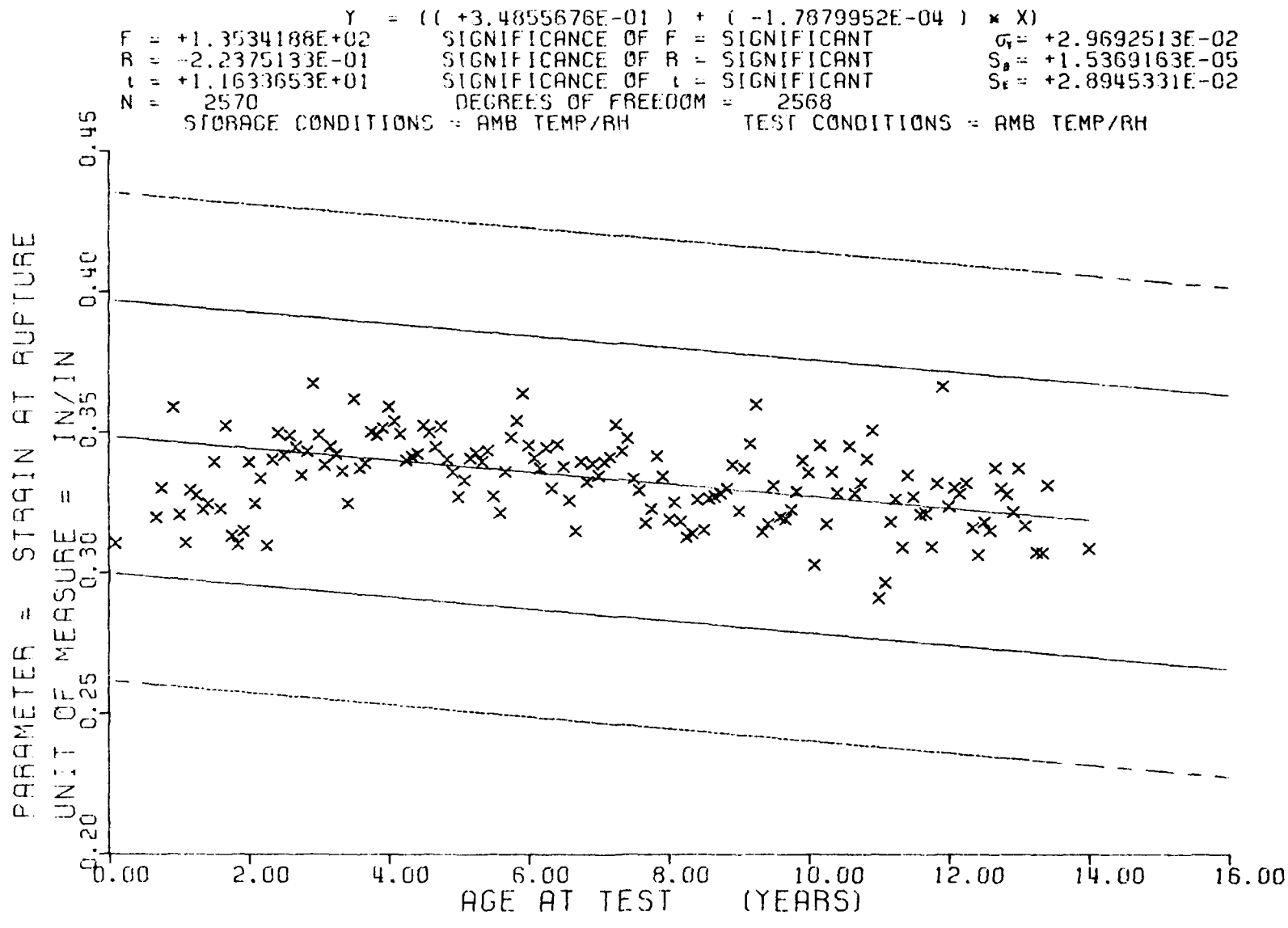

Y = (( +3.4855676E-01 ) + ( -1.7879952E-04 ) * X)
F = +1.3534188E+02 SIGNIFICANCE OF F = SIGNIFICANT σ_r = +2.9692513E-02
R = -2.2375133E-01 SIGNIFICANCE OF R = SIGNIFICANT S_β = +1.5369163E-05
t = +1.1633653E+01 SIGNIFICANCE OF t = SIGNIFICANT S_ε = +2.8945331E-02
N = 2570 DEGREES OF FREEDOM = 2568
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = IN/IN
0.45
0.40
0.35
0.30
0.25
0.20
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6,H.R.TRIAXIAL TENSILE,STRAIN AT RUPTURE,CHS=1750 IN/MIN, 800 PSI

Figure 18

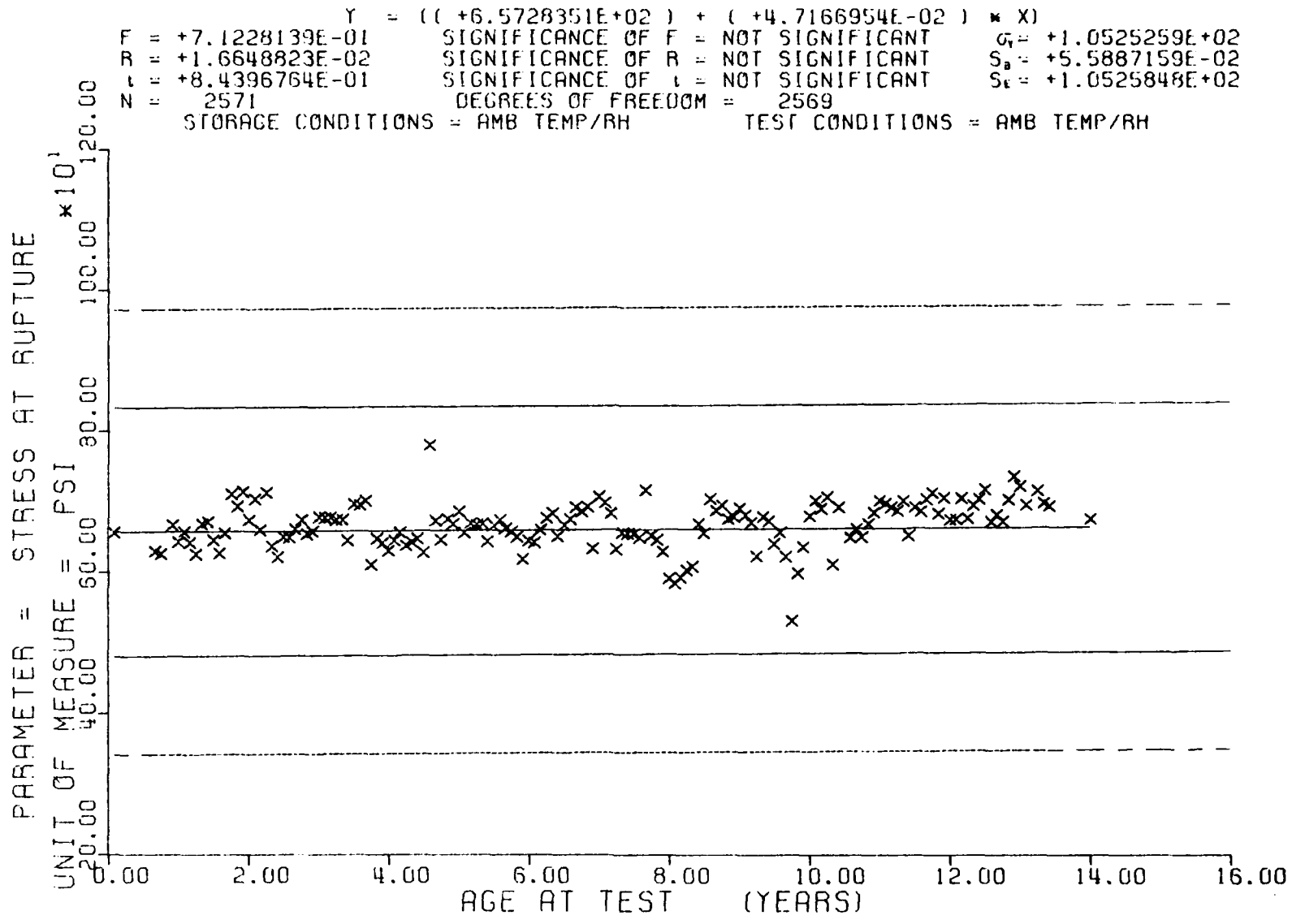
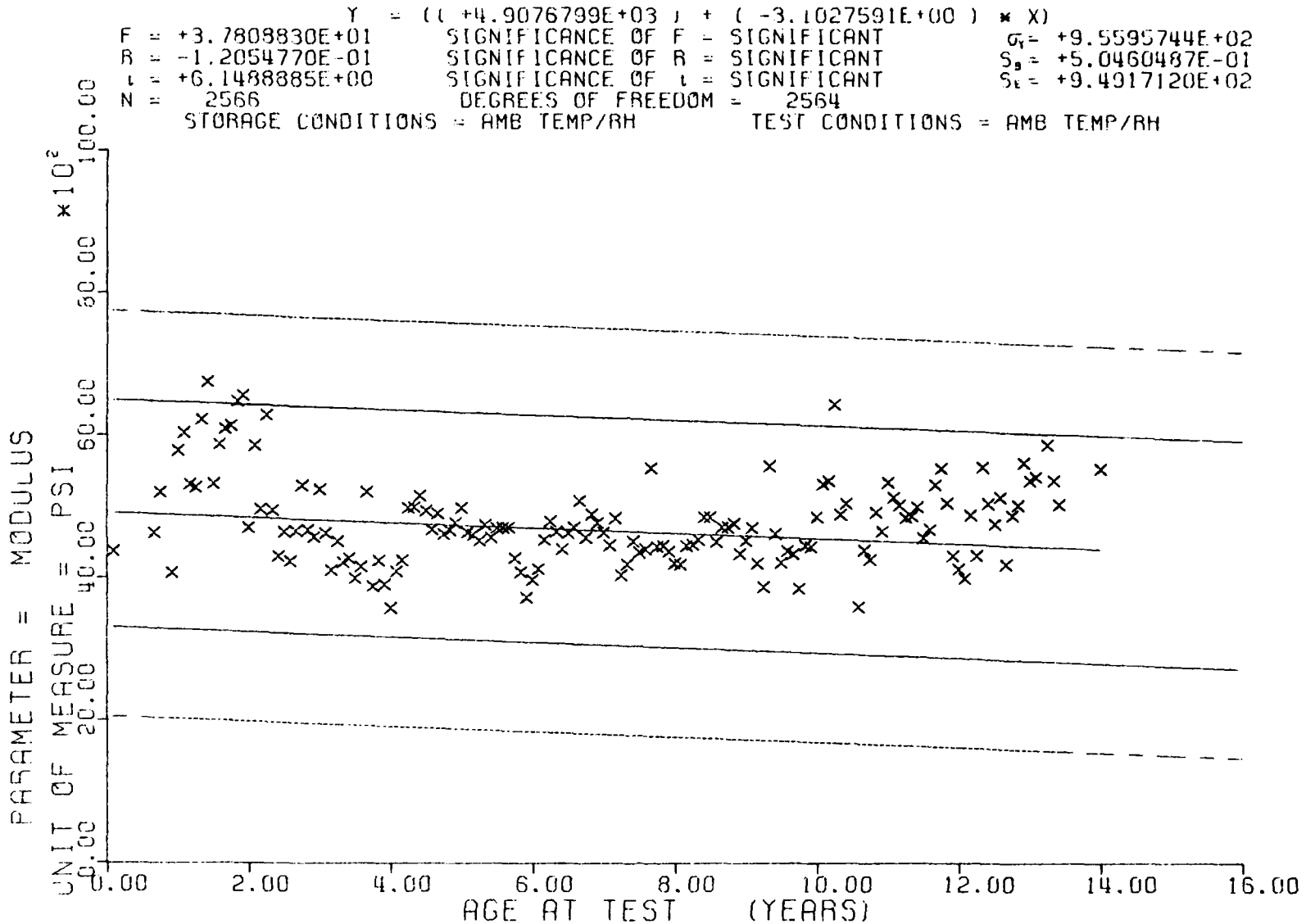

Y = (( +6.5728351E+02 ) + ( +4.7166954E-02 ) * X)
F = +7.1228139E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT σ = +1.0525259E+02
R = +1.6648823E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT Sa = +5.5887159E-02
t = +8.4396764E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT Sε = +1.0525848E+02
N = 2571 DEGREES OF FREEDOM = 2569
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI
*10¹
120.00
100.00
80.00
60.00
40.00
20.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING G,H.R.TRIAXIAL TENSILE,STRESS AT RUPTURE,CHS=1750 IN/MIN, 800 PSI

Figure 19




WING 6,H.R.TRIAXIAL TENSILE,MODULUS,CHS=1750 IN/MIN AT 800 PSI

Figure 20

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 2 | 35 | 7 | 60 | 38 | 85 | 15 | 110 | 40 | 135 | 13 |
| 11 | 12 | 36 | 26 | 61 | 45 | 86 | 11 | 111 | 17 | 136 | 10 |
| 12 | 12 | 37 | 26 | 62 | 68 | 87 | 27 | 112 | 12 | 137 | 21 |
| 13 | 18 | 38 | 24 | 63 | 120 | 88 | 23 | 113 | 81 | 138 | 51 |
| 14 | 4 | 39 | 34 | 64 | 43 | 89 | 46 | 114 | 57 | 139 | 65 |
| 15 | 12 | 40 | 11 | 65 | 41 | 90 | 50 | 115 | 29 | 140 | 6 |
| 16 | 8 | 41 | 21 | 66 | 16 | 91 | 30 | 116 | 32 | 141 | 12 |
| 17 | 12 | 42 | 7 | 67 | 22 | 92 | 18 | 117 | 120 | 142 | 10 |
| 18 | 14 | 43 | 7 | 68 | 48 | 93 | 28 | 118 | 31 | 143 | 8 |
| 19 | 4 | 44 | 12 | 69 | 47 | 94 | 31 | 119 | 34 | 144 | 19 |
| 20 | 4 | 45 | 5 | 70 | 40 | 95 | 21 | 120 | 48 | 145 | 14 |
| 21 | 24 | 46 | 9 | 71 | 40 | 96 | 29 | 121 | 25 | 146 | 38 |
| 22 | 4 | 47 | 10 | 72 | 38 | 97 | 34 | 122 | 6 | 147 | 18 |
| 23 | 2 | 48 | 4 | 73 | 73 | 98 | 29 | 123 | 19 | 148 | 7 |
| 24 | 16 | 49 | 28 | 74 | 49 | 99 | 17 | 124 | 14 | 149 | 9 |
| 25 | 24 | 50 | 26 | 75 | 41 | 100 | 16 | 125 | 34 | 150 | 8 |
| 26 | 12 | 51 | 57 | 76 | 29 | 101 | 23 | 126 | 16 | 151 | 2 |
| 27 | 31 | 52 | 100 | 77 | 19 | 102 | 9 | 127 | 24 | 152 | 2 |
| 28 | 20 | 53 | 49 | 78 | 30 | 103 | 7 | 128 | 28 | 153 | 4 |
| 29 | 37 | 54 | 16 | 79 | 63 | 104 | 24 | 129 | 12 | 154 | 4 |
| 30 | 28 | 55 | 43 | 80 | 20 | 105 | 9 | 130 | 23 | 155 | 5 |
| 31 | 29 | 56 | 90 | 81 | 17 | 106 | 11 | 131 | 28 | 156 | 2 |
| 32 | 42 | 57 | 52 | 82 | 24 | 107 | 12 | 132 | 32 | 157 | 5 |
| 33 | 24 | 58 | 54 | 83 | 23 | 108 | 12 | 133 | 11 | 158 | 8 |
| 34 | 21 | 59 | 24 | 84 | 8 | 109 | 23 | 134 | 34 | 161 | 6 |
| | | | | | | | | | | 168 | 2 |

WING 6,H.P.HYDROSTATIC,STRAIN AT MAX STRESS,1750 IN/MIN,800 PSI

This sample size summary is applicable to figures 21 thru 25

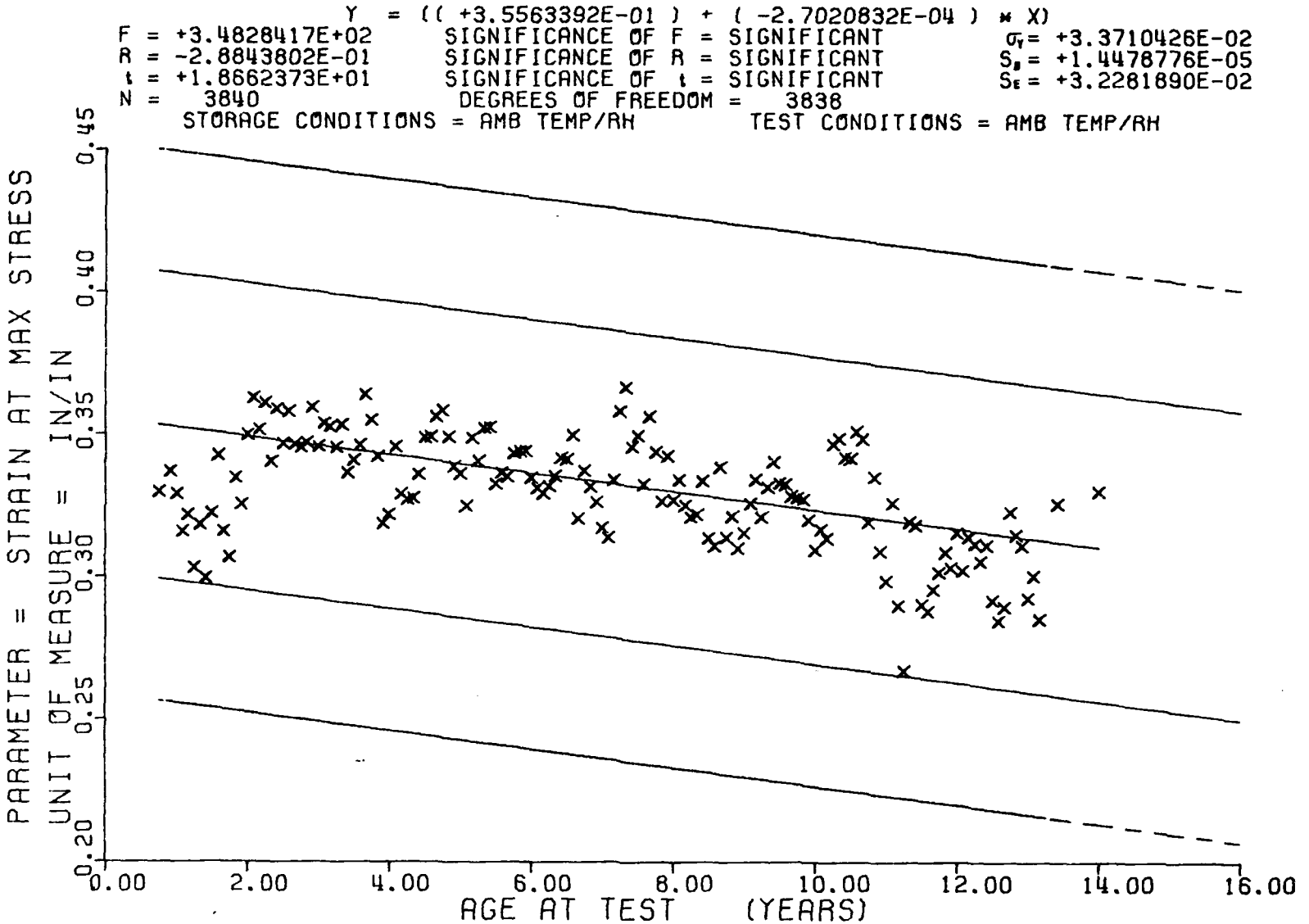

Y = (( +3.5563392E-01 ) + ( -2.7020832E-04 ) * X)
F = +3.4828417E+02 SIGNIFICANCE OF F = SIGNIFICANT
R = -2.8843802E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +1.8662373E+01 SIGNIFICANCE OF t = SIGNIFICANT
N = 3840 DEGREES OF FREEDOM = 3838
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
σY = +3.3710426E-02
Sa = +1.4478776E-05
Se = +3.2281890E-02
PARAMETER = STRAIN AT MAX STRESS
UNIT OF MEASURE = IN/IN
0.45
0.40
0.35
0.30
0.25
0.20
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6,H.R.HYDROSTATIC,STRAIN AT MAX STRESS,1750IN/MIN,800 PSI

Figure 21

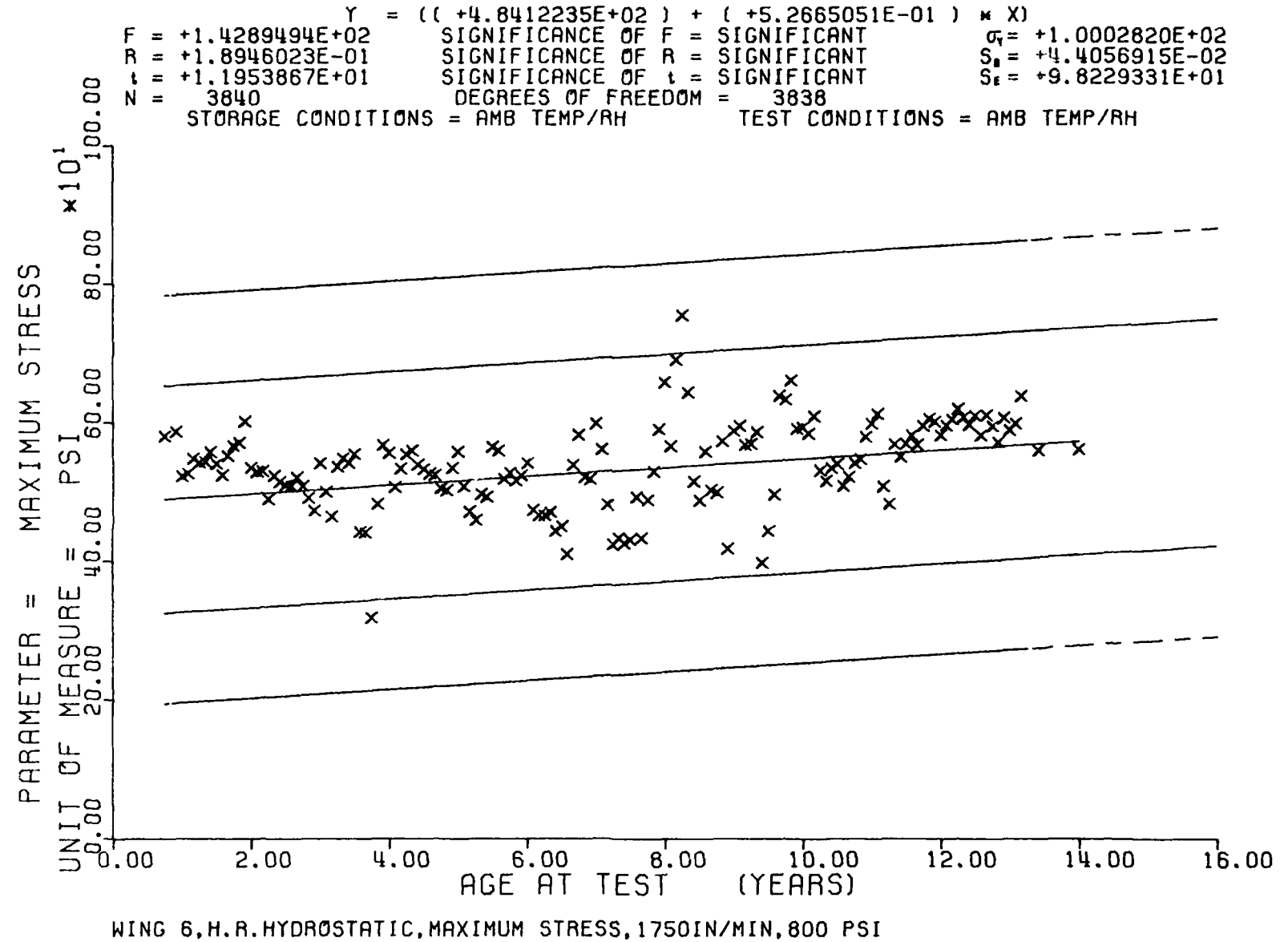

Y = (( +4.8412235E+02 ) + ( +5.2665051E-01 ) * X)
F = +1.4289494E+02 SIGNIFICANCE OF F = SIGNIFICANT σ_Y = +1.0002820E+02
R = +1.8946023E-01 SIGNIFICANCE OF R = SIGNIFICANT S_B = +4.4056915E-02
t = +1.1953867E+01 SIGNIFICANCE OF t = SIGNIFICANT S_E = +9.8229331E+01
N = 3840 DEGREES OF FREEDOM = 3838
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = MAXIMUM STRESS
UNIT OF MEASURE = PSI *10^1
0.00
20.00
40.00
60.00
80.00
100.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6,H.R.HYDROSTATIC,MAXIMUM STRESS,1750IN/MIN,800 PSI

Figure 22

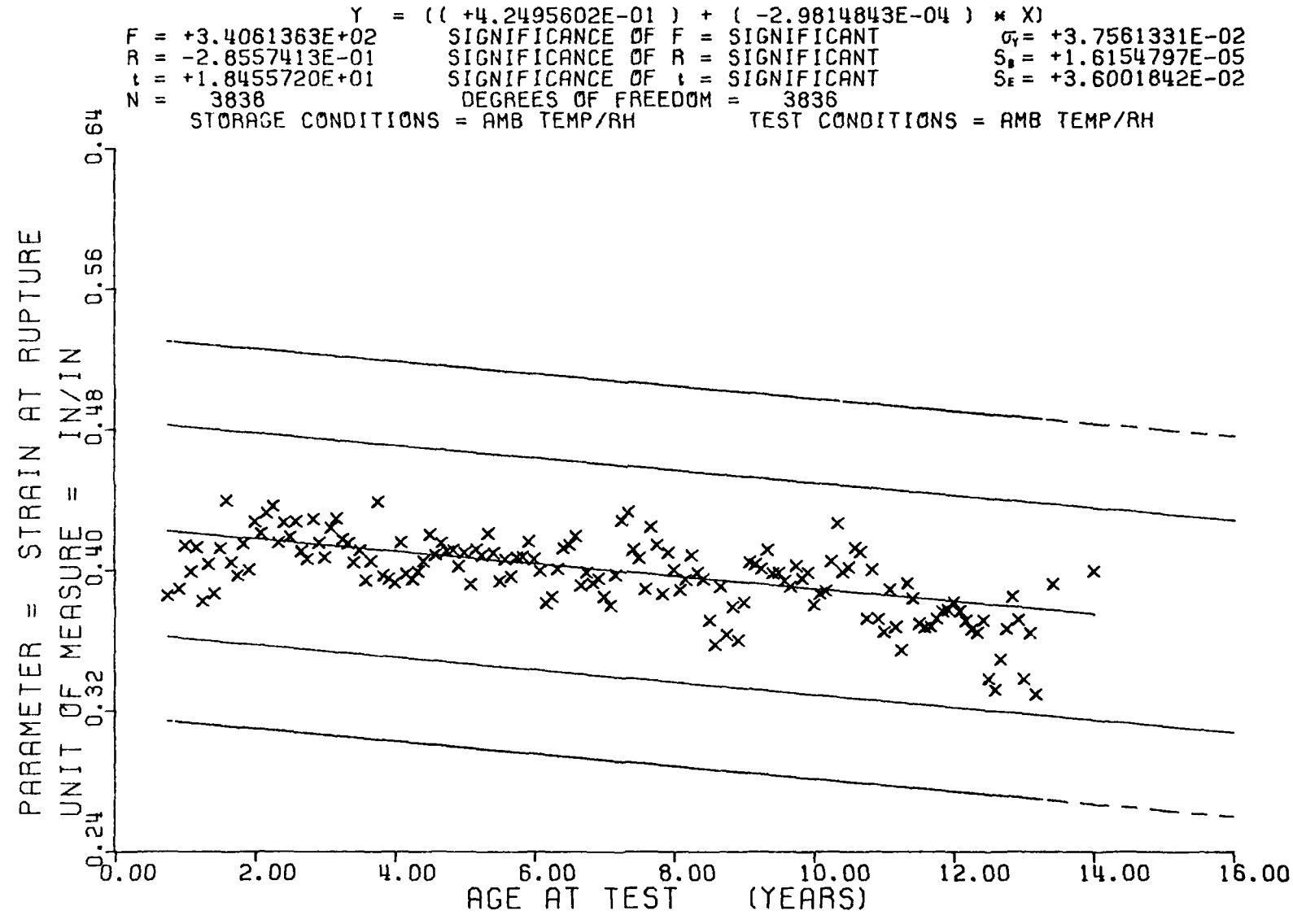

Y = (( +4.2495602E-01 ) + ( -2.9814843E-04 ) * X)
F = +3.4061363E+02 SIGNIFICANCE OF F = SIGNIFICANT σY = +3.7561331E-02
R = -2.8557413E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +1.6154797E-05
t = +1.8455720E+01 SIGNIFICANCE OF t = SIGNIFICANT SE = +3.6001842E-02
N = 3838 DEGREES OF FREEDOM = 3836
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT RUPTURE
UNIT OF MEASURE = IN/IN
0.64
0.56
0.48
0.40
0.32
0.24
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6,H.R.HYDROSTATIC,STRAIN AT RUPTURE,1750IN/MIN,800 PSI

Figure 23

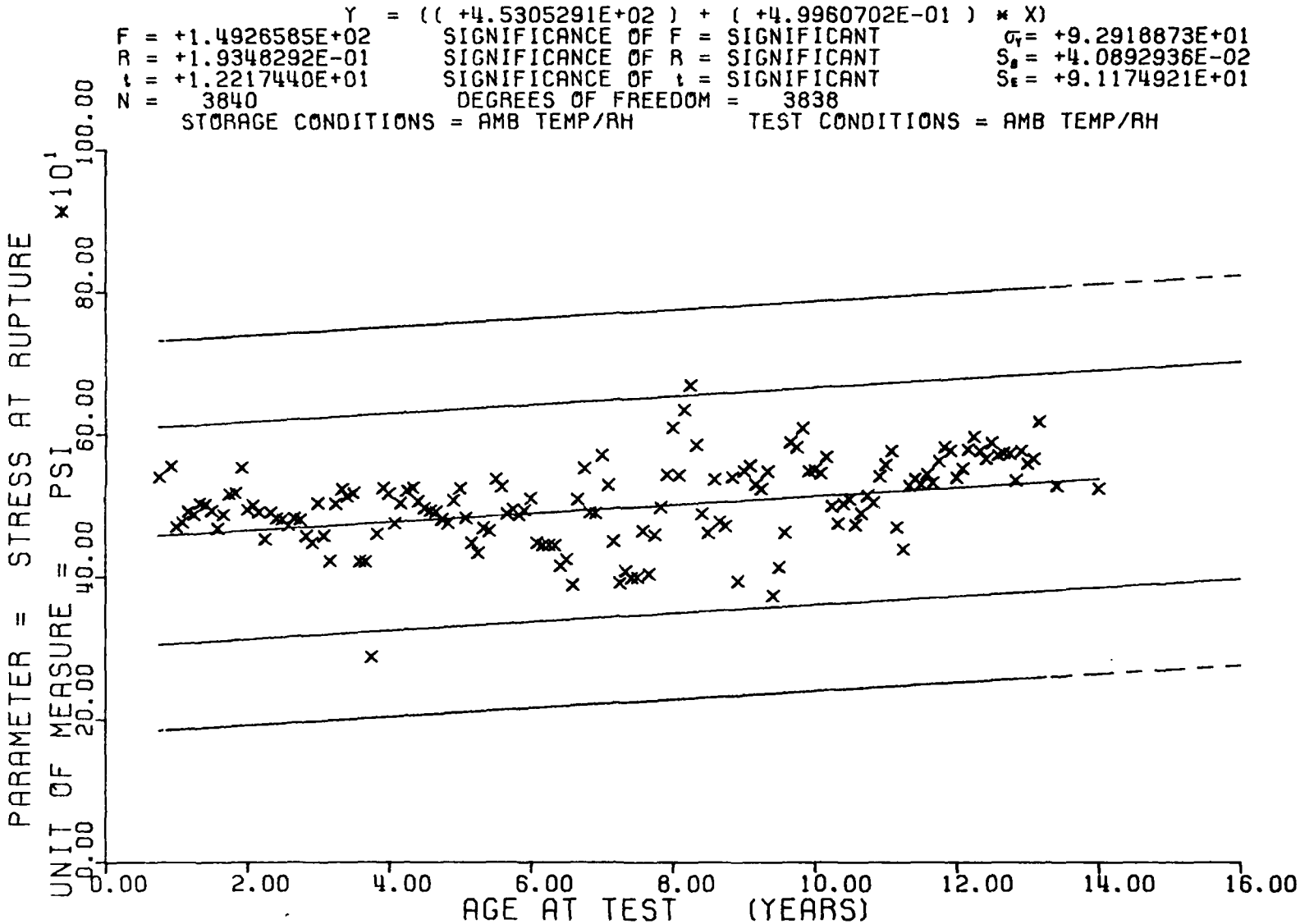
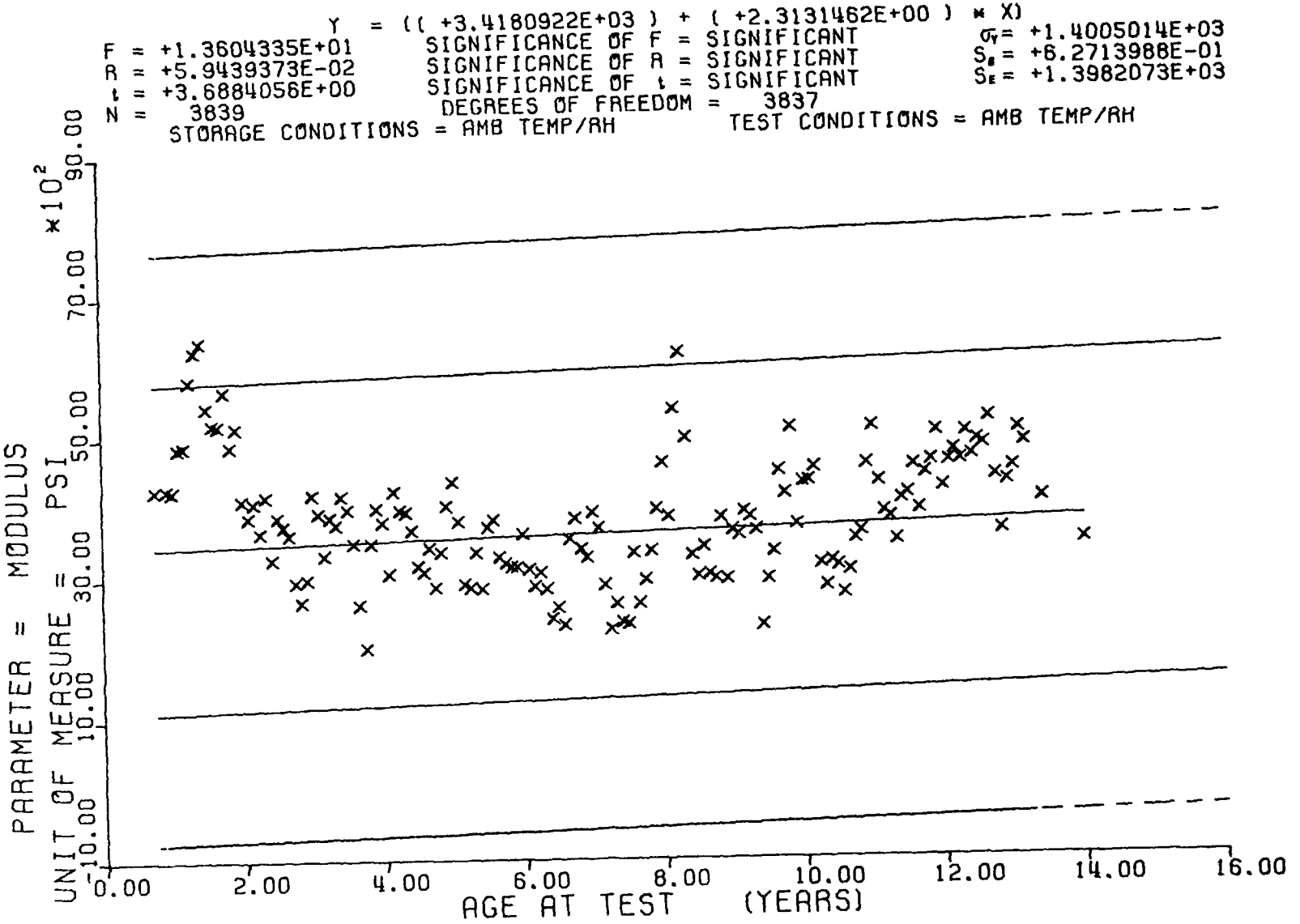

Y = (( +4.5305291E+02 ) + ( +4.9960702E-01 ) * X)
F = +1.4926585E+02 SIGNIFICANCE OF F = SIGNIFICANT
R = +1.9348292E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +1.2217440E+01 SIGNIFICANCE OF t = SIGNIFICANT
N = 3840 DEGREES OF FREEDOM = 3838
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRESS AT RUPTURE
UNIT OF MEASURE = PSI
0.00
20.00
40.00
60.00
80.00
100.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6,H.R.HYDROSTATIC,STRESS AT RUPTURE,1750IN/MIN,600 PSI

Figure 24




WING 6,H.R.HYDROSTATIC,MODULUS,1750 IN/MIN, 800 PSI

Figure 25

*** SAMPLE SIZE SUMMARY ***

| AST (MPS) | NR SAMP |
|---|---|
| 26 | 13 |
| 31 | 12 |
| 36 | 11 |
| 56 | 5 |
| 57 | 13 |
| 59 | 14 |
| 65 | 12 |
| 91 | 7 |
| 94 | 14 |
| 120 | 12 |
| 121 | 12 |



STAGE I WING 6 TP-H1011 TEAR ENERGY TEST/TEMP=77 DEG F

This sample size summary is applicable to figure 26

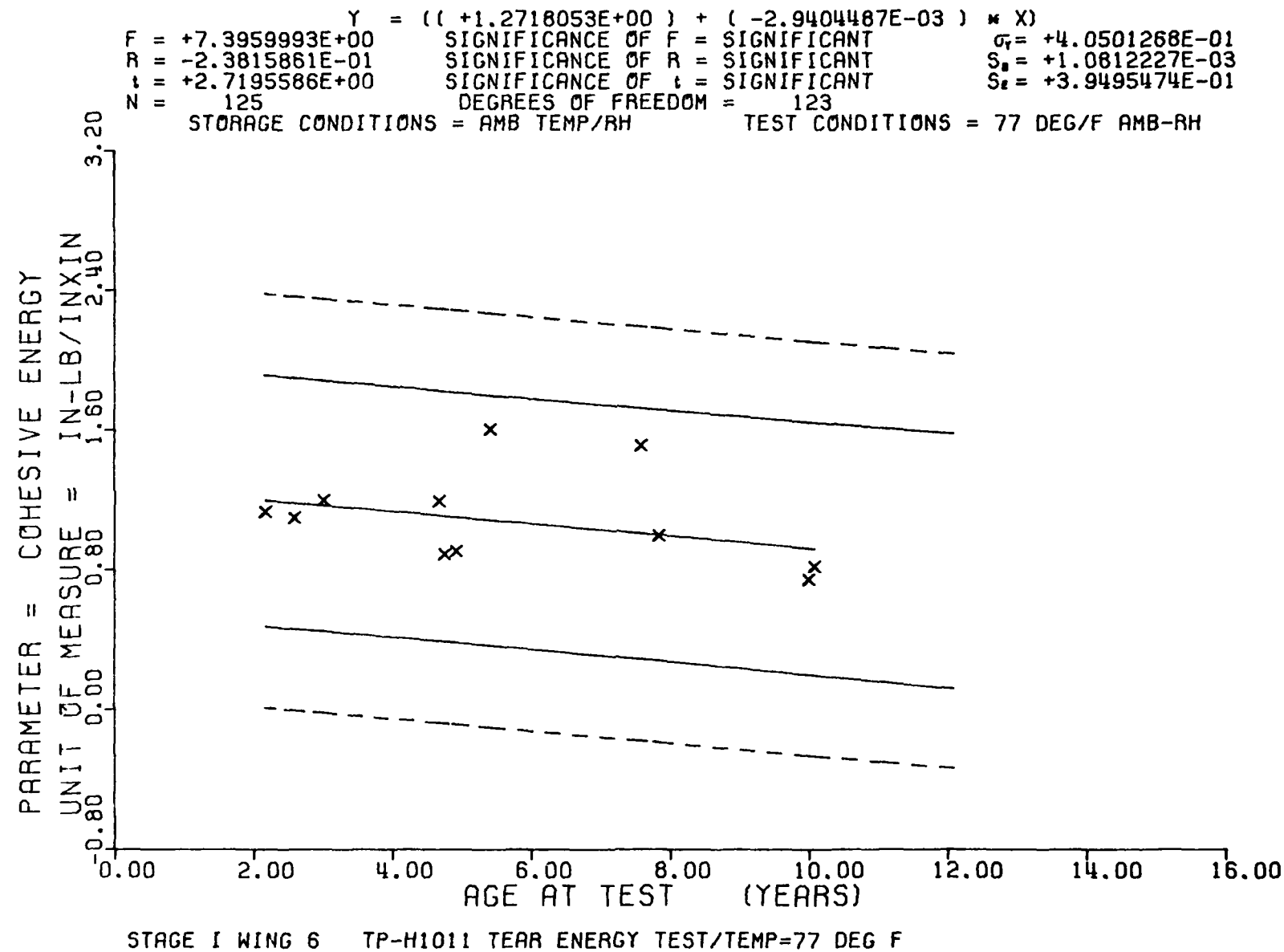

Y = (( +1.2718053E+00 ) + ( -2.9404487E-03 ) * X)
F = +7.3959993E+00 SIGNIFICANCE OF F = SIGNIFICANT
R = -2.3815861E-01 SIGNIFICANCE OF R = SIGNIFICANT
t = +2.7195586E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 125 DEGREES OF FREEDOM = 123
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 77 DEG/F AMB-RH
PARAMETER = COHESIVE ENERGY
UNIT OF MEASURE = IN-LB/INXIN
3.20
2.40
1.60
0.80
0.00
-0.80
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STAGE I WING 6 TP-H1011 TEAR ENERGY TEST/TEMP=77 DEG F

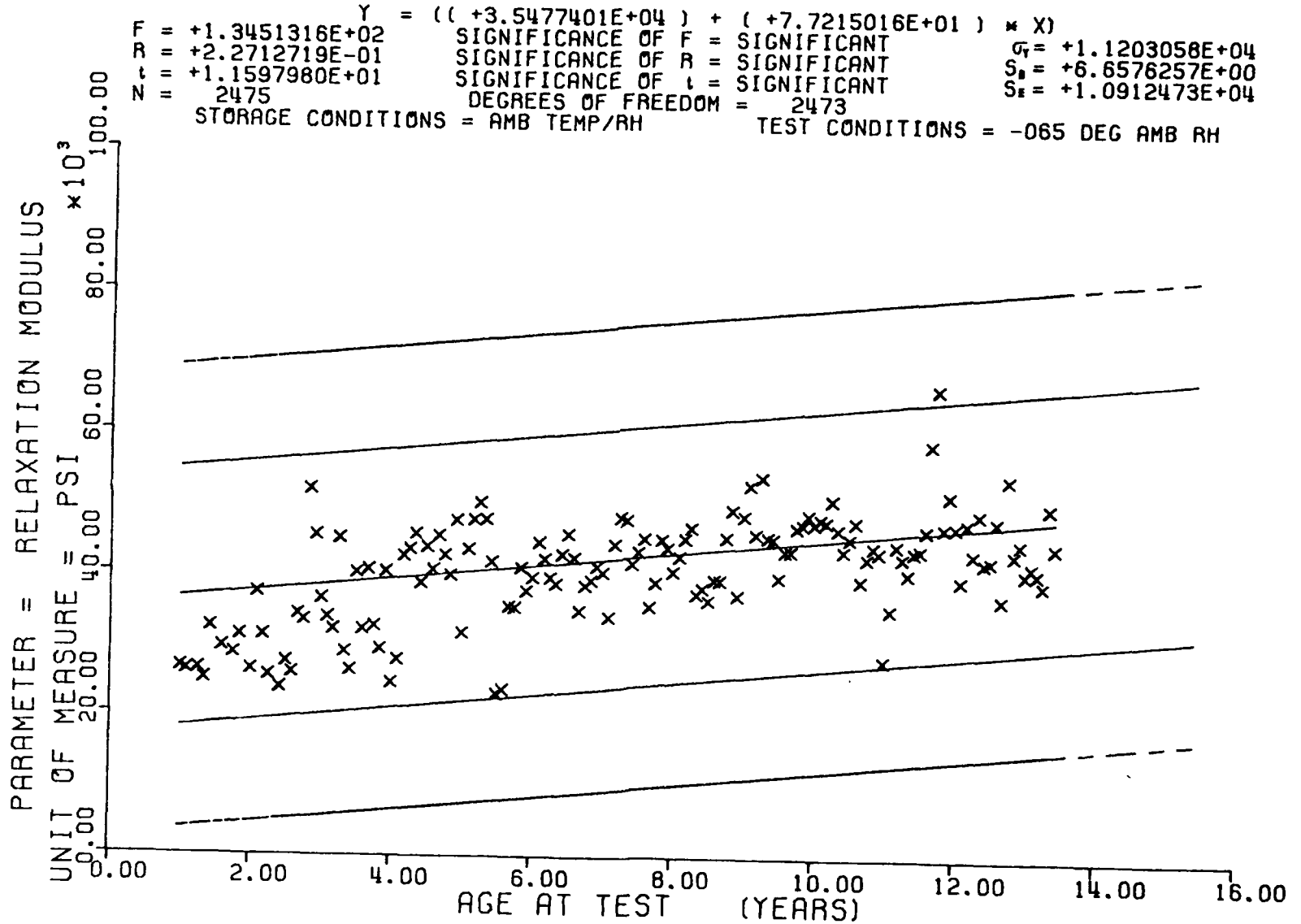
Figure 26

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 2 | 42 | 6 | 67 | 9 | 92 | 9 | 117 | 27 | 142 | 18 |
| 13 | 3 | 43 | 12 | 68 | 9 | 93 | 25 | 118 | 21 | 143 | 38 |
| 15 | 1 | 44 | 3 | 69 | 20 | 94 | 26 | 119 | 19 | 144 | 9 |
| 16 | 3 | 45 | 6 | 70 | 30 | 95 | 26 | 120 | 36 | 145 | 3 |
| 17 | 4 | 46 | 3 | 71 | 41 | 96 | 51 | 121 | 21 | 146 | 6 |
| 19 | 3 | 47 | 6 | 72 | 30 | 97 | 54 | 122 | 6 | 147 | 9 |
| 21 | 4 | 48 | 6 | 73 | 39 | 98 | 55 | 123 | 6 | 148 | 3 |
| 23 | 3 | 49 | 2 | 74 | 32 | 99 | 41 | 124 | 27 | 149 | 12 |
| 24 | 6 | 50 | 26 | 75 | 32 | 100 | 23 | 125 | 20 | 150 | 3 |
| 25 | 6 | 51 | 49 | 76 | 17 | 101 | 27 | 126 | 21 | 151 | 12 |
| 26 | 9 | 52 | 46 | 77 | 40 | 102 | 8 | 127 | 12 | 152 | 3 |
| 27 | 3 | 53 | 18 | 78 | 28 | 103 | 18 | 128 | 23 | 153 | 32 |
| 29 | 3 | 54 | 27 | 79 | 15 | 104 | 12 | 129 | 2 | 154 | 6 |
| 30 | 3 | 55 | 27 | 80 | 17 | 105 | 9 | 130 | 36 | 155 | 6 |
| 31 | 3 | 56 | 21 | 81 | 23 | 106 | 3 | 131 | 36 | 156 | 6 |
| 32 | 6 | 57 | 24 | 82 | 35 | 107 | 9 | 132 | 8 | 157 | 6 |
| 33 | 6 | 58 | 20 | 83 | 12 | 108 | 15 | 133 | 18 | 158 | 3 |
| 34 | 3 | 59 | 9 | 84 | 17 | 109 | 15 | 134 | 28 | 159 | 3 |
| 35 | 6 | 60 | 9 | 85 | 18 | 110 | 9 | 135 | 18 | 160 | 3 |
| 36 | 19 | 61 | 21 | 86 | 9 | 111 | 6 | 136 | 2 | 161 | 9 |
| 37 | 9 | 62 | 46 | 87 | 33 | 112 | 17 | 137 | 9 | | |
| 38 | 6 | 63 | 23 | 88 | 19 | 113 | 45 | 138 | 34 | | |
| 39 | 6 | 64 | 30 | 89 | 21 | 114 | 35 | 139 | 45 | | |
| 40 | 8 | 65 | 9 | 90 | 30 | 115 | 46 | 140 | 6 | | |
| 41 | 6 | 66 | 2 | 91 | 14 | 116 | 36 | 141 | 12 | | |

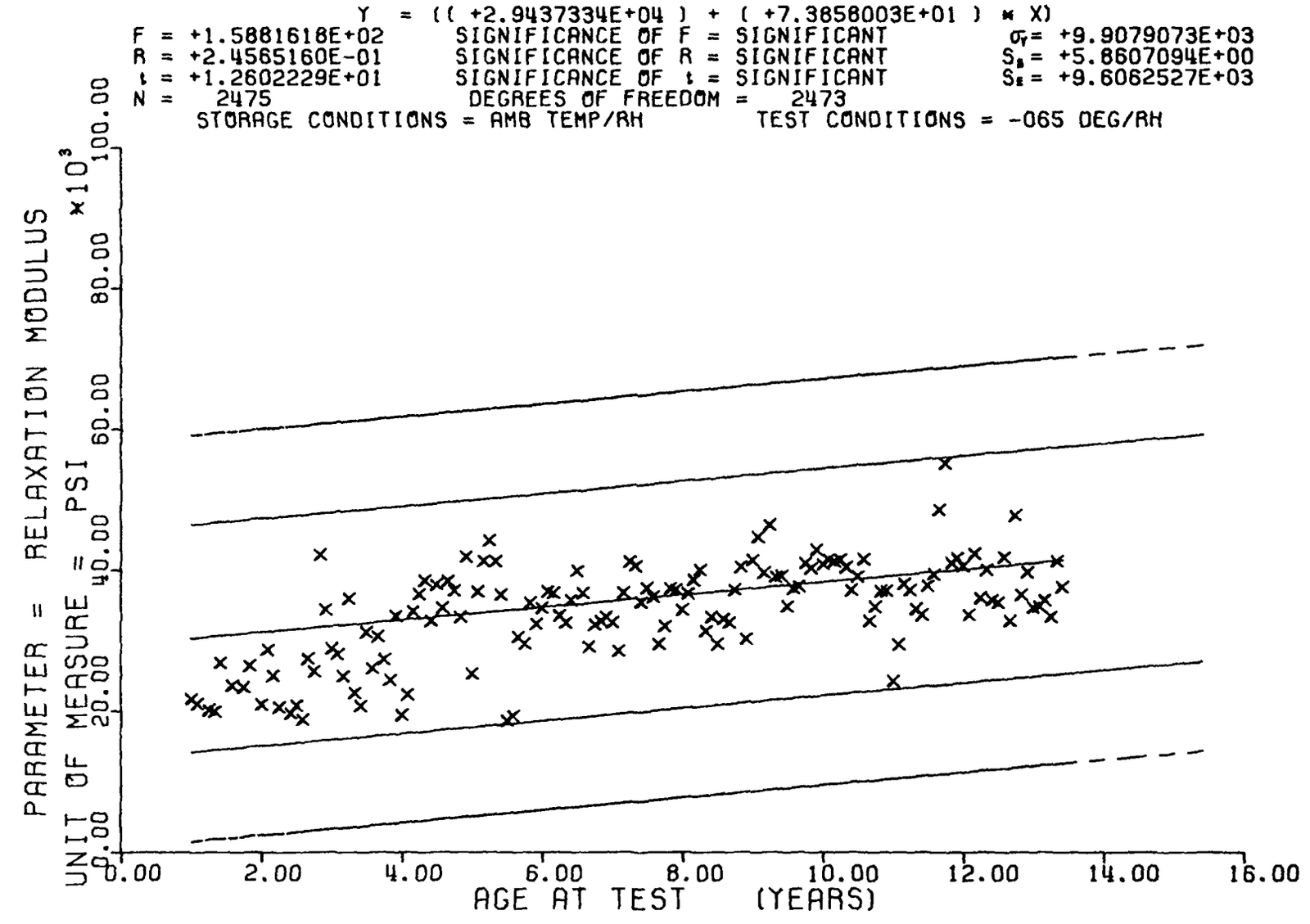
WING 6,STRESS RELAXATION MODULUS,0.5% STRAIN,10 SEC,-65 DEG F,TPH-1011

This sample size summary is applicable to figure 27 and 28




WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 10 SEC, -65 DEG F, TPH-1011

Figure 27




WING 6,STRESS RELAXATION MODULUS,0.5% STRAIN,50 SEC,-65 DEG F,TPH-1011

Figure 28

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|
| 49 | 2 | 74 | 32 | 99 | 41 | 124 | 27 | 149 | 12 |
| 50 | 26 | 75 | 32 | 100 | 23 | 125 | 20 | 150 | 3 |
| 51 | 49 | 76 | 17 | 101 | 27 | 126 | 21 | 151 | 12 |
| 52 | 46 | 77 | 40 | 102 | 8 | 127 | 12 | 152 | 3 |
| 53 | 19 | 78 | 28 | 103 | 18 | 128 | 23 | 153 | 32 |
| 54 | 27 | 79 | 15 | 104 | 12 | 129 | 2 | 154 | 6 |
| 55 | 27 | 80 | 17 | 105 | 9 | 130 | 36 | 155 | 6 |
| 56 | 21 | 81 | 23 | 106 | 3 | 131 | 36 | 156 | 6 |
| 57 | 24 | 82 | 35 | 107 | 9 | 132 | 8 | 157 | 6 |
| 58 | 20 | 83 | 12 | 108 | 15 | 133 | 18 | 158 | 3 |
| 59 | 9 | 84 | 17 | 109 | 15 | 134 | 28 | 159 | 3 |
| 60 | 6 | 85 | 18 | 110 | 9 | 135 | 18 | 160 | 3 |
| 61 | 21 | 86 | 9 | 111 | 6 | 136 | 2 | 161 | 9 |
| 62 | 46 | 87 | 33 | 112 | 17 | 137 | 9 | | |
| 63 | 23 | 88 | 19 | 113 | 45 | 138 | 34 | | |
| 64 | 30 | 89 | 21 | 114 | 35 | 139 | 45 | | |
| 65 | 9 | 90 | 30 | 115 | 46 | 140 | 6 | | |
| 66 | 2 | 91 | 14 | 116 | 36 | 141 | 12 | | |
| 67 | 6 | 92 | 9 | 117 | 27 | 142 | 18 | | |
| 68 | 9 | 93 | 25 | 118 | 21 | 143 | 38 | | |
| 69 | 20 | 94 | 26 | 119 | 19 | 144 | 9 | | |
| 70 | 30 | 95 | 26 | 120 | 36 | 145 | 3 | | |
| 71 | 41 | 96 | 51 | 121 | 21 | 146 | 6 | | |
| 72 | 30 | 97 | 54 | 122 | 6 | 147 | 9 | | |
| 73 | 39 | 98 | 55 | 123 | 6 | 148 | 3 | | |

WING 6,STRESS RELAXATION MODULUS,0.5% STRAIN,1000 SEC,-65 DEG F,TPH=1011

This sample size summary is applicable to figures 29 and 30

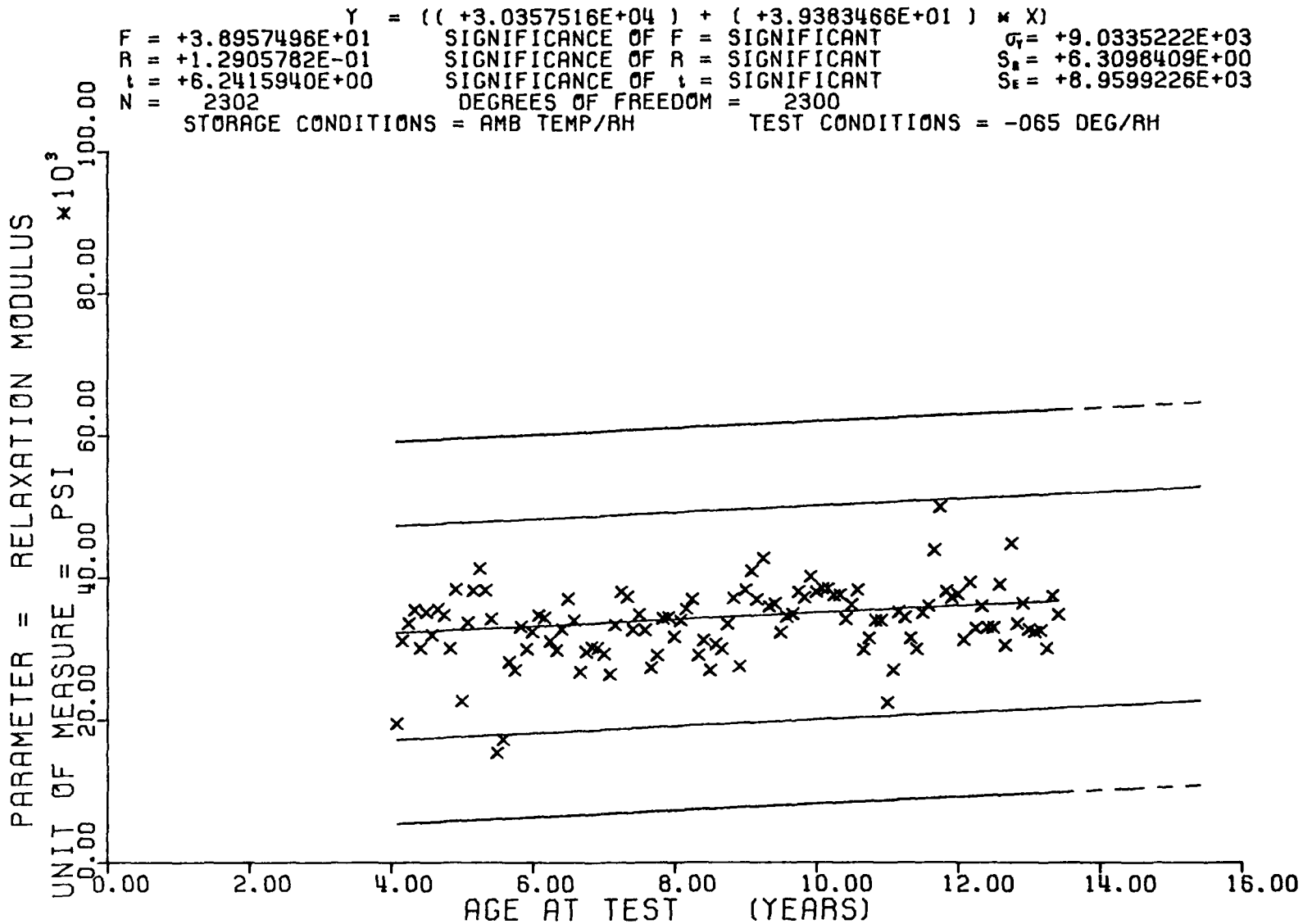

Y = (( +3.0357516E+04 ) + ( +3.9383466E+01 ) * X)
F = +3.8957496E+01 SIGNIFICANCE OF F = SIGNIFICANT σ_Y = +9.0335222E+03
R = +1.2905782E-01 SIGNIFICANCE OF R = SIGNIFICANT S_B = +6.3098409E+00
t = +6.2415940E+00 SIGNIFICANCE OF t = SIGNIFICANT S_E = +8.9599226E+03
N = 2302 DEGREES OF FREEDOM = 2300
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -065 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI *10^3
0.00
20.00
40.00
60.00
80.00
100.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6,STRESS RELAXATION MODULUS,0.5% STRAIN,100 SEC,-65 DEG F,TPH-1011

Figure 29

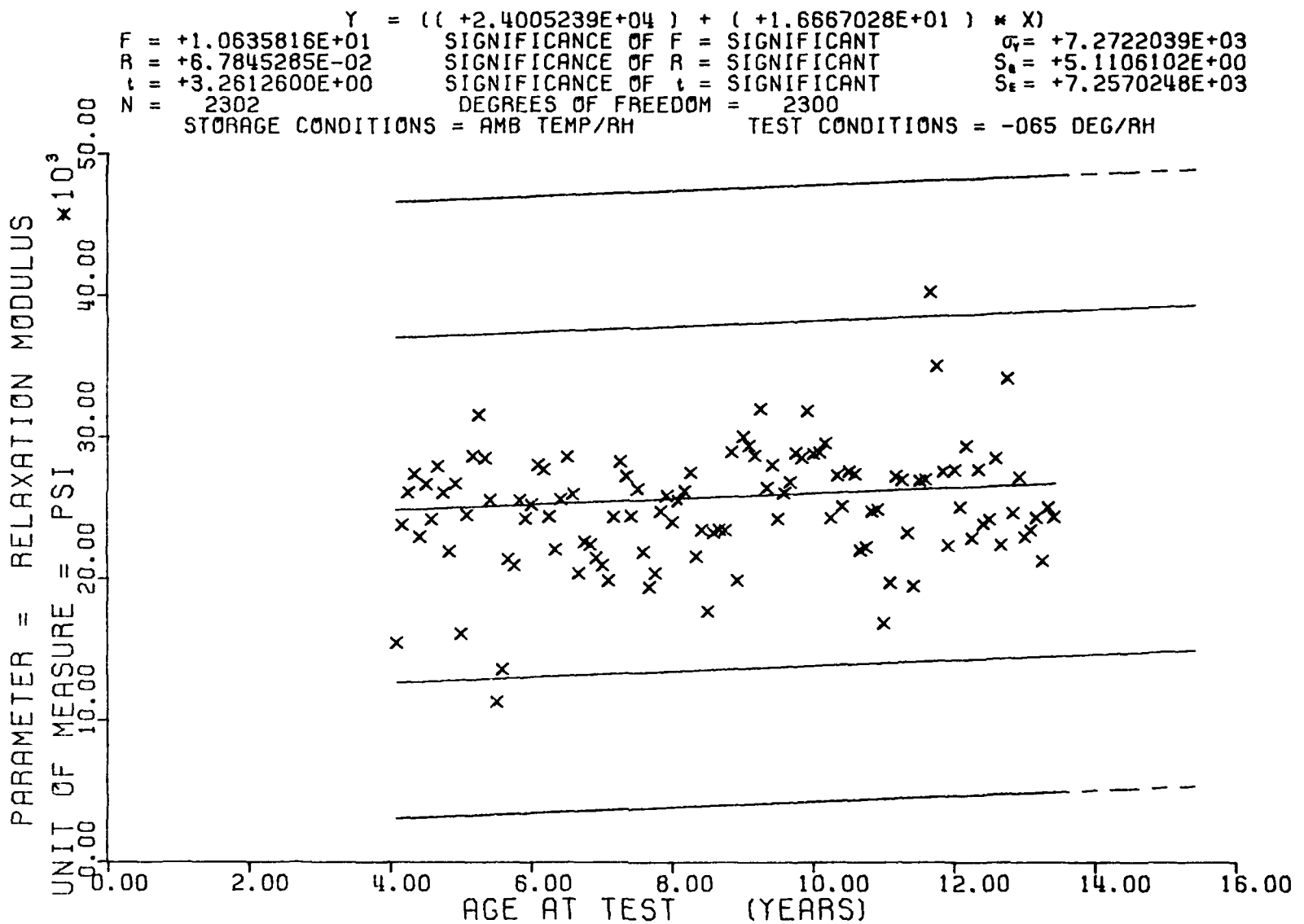

Y = (( +2.4005239E+04 ) + ( +1.6667028E+01 ) * X)
F = +1.0635816E+01 SIGNIFICANCE OF F = SIGNIFICANT σY = +7.2722039E+03
R = +6.7845285E-02 SIGNIFICANCE OF R = SIGNIFICANT Sa = +5.1106102E+00
t = +3.2612600E+00 SIGNIFICANCE OF t = SIGNIFICANT Sε = +7.2570248E+03
N = 2302 DEGREES OF FREEDOM = 2300
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -065 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI *10³
0.00
10.00
20.00
30.00
40.00
50.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6,STRESS RELAXATION MODULUS,0.5% STRAIN,1000 SEC,-65 DEG F,TPH-1011

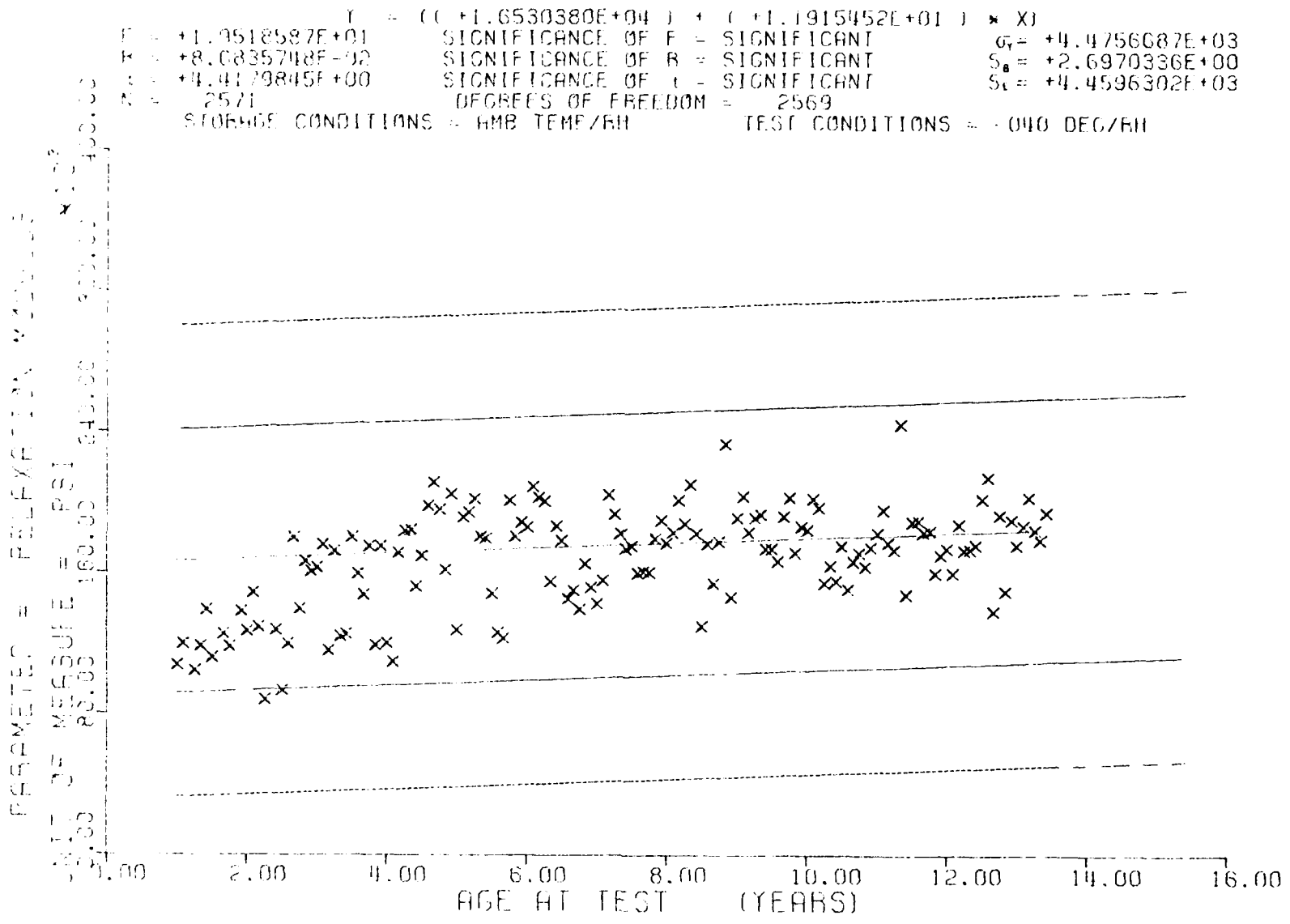
Figure 30

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 3 | 41 | 2 | 66 | 6 | 91 | 18 | 116 | 43 | 141 | 12 |
| 13 | 3 | 42 | 9 | 67 | 6 | 92 | 24 | 117 | 21 | 142 | 30 |
| 15 | 3 | 43 | 9 | 68 | 12 | 93 | 18 | 118 | 21 | 143 | 37 |
| 16 | 3 | 44 | 3 | 69 | 21 | 94 | 22 | 119 | 15 | 144 | 9 |
| 17 | 7 | 45 | 6 | 70 | 30 | 95 | 21 | 120 | 29 | 145 | 3 |
| 18 | 3 | 46 | 3 | 71 | 44 | 96 | 57 | 121 | 21 | 146 | 3 |
| 20 | 3 | 47 | 9 | 72 | 36 | 97 | 68 | 122 | 6 | 147 | 9 |
| 21 | 6 | 48 | 3 | 73 | 35 | 98 | 54 | 123 | 8 | 148 | 3 |
| 23 | 3 | 49 | 6 | 74 | 34 | 99 | 42 | 124 | 16 | 149 | 12 |
| 24 | 3 | 50 | 27 | 75 | 28 | 100 | 21 | 125 | 16 | 150 | 3 |
| 25 | 6 | 51 | 51 | 76 | 29 | 101 | 24 | 126 | 19 | 151 | 12 |
| 26 | 7 | 52 | 47 | 77 | 36 | 102 | 6 | 127 | 44 | 152 | 3 |
| 27 | 3 | 53 | 14 | 78 | 35 | 103 | 21 | 128 | 20 | 153 | 6 |
| 29 | 6 | 54 | 30 | 79 | 15 | 104 | 15 | 129 | 1 | 154 | 6 |
| 30 | 3 | 55 | 18 | 80 | 19 | 105 | 9 | 130 | 33 | 155 | 6 |
| 31 | 6 | 56 | 12 | 81 | 24 | 106 | 3 | 131 | 45 | 156 | 6 |
| 32 | 3 | 57 | 27 | 82 | 33 | 107 | 9 | 132 | 9 | 157 | 6 |
| 33 | 6 | 58 | 19 | 83 | 9 | 108 | 18 | 133 | 12 | 158 | 3 |
| 34 | 6 | 59 | 9 | 84 | 24 | 109 | 12 | 134 | 40 | 159 | 3 |
| 35 | 3 | 60 | 12 | 85 | 21 | 110 | 9 | 135 | 15 | 160 | 3 |
| 36 | 18 | 61 | 20 | 86 | 15 | 111 | 6 | 136 | 3 | 161 | 9 |
| 37 | 9 | 62 | 48 | 87 | 30 | 112 | 21 | 137 | 15 | | |
| 38 | 5 | 63 | 24 | 88 | 23 | 113 | 53 | 138 | 41 | | |
| 39 | 6 | 64 | 24 | 89 | 21 | 114 | 37 | 139 | 51 | | |
| 40 | 12 | 65 | 9 | 90 | 29 | 115 | 57 | 140 | 6 | | |

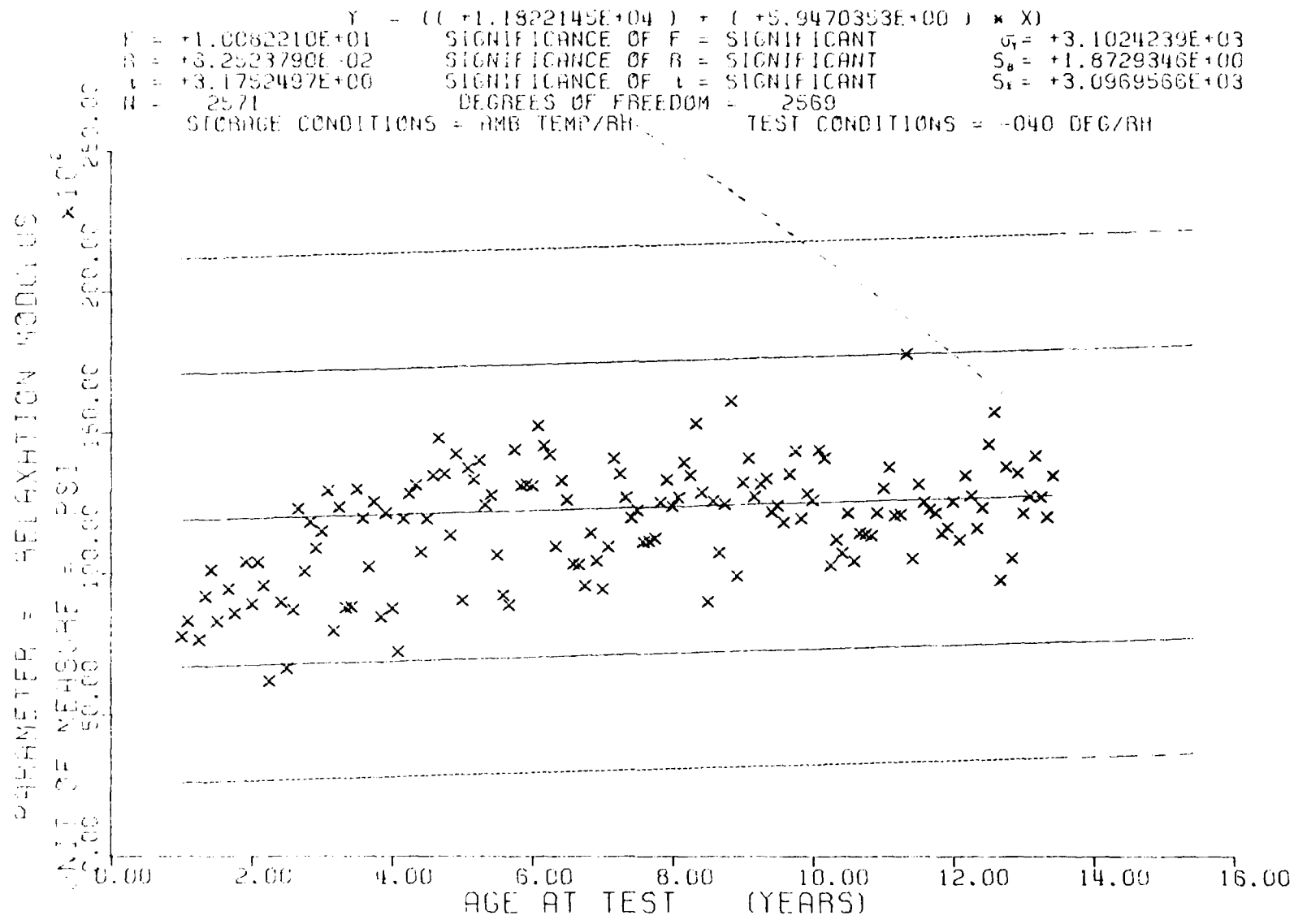
WING 6,STRESS RELAXATION MODULUS,0.5% STRAIN,1000 SEC,-40 DEG F,TPH-1011

This sample size summary is applicable to figures 31 thru 34



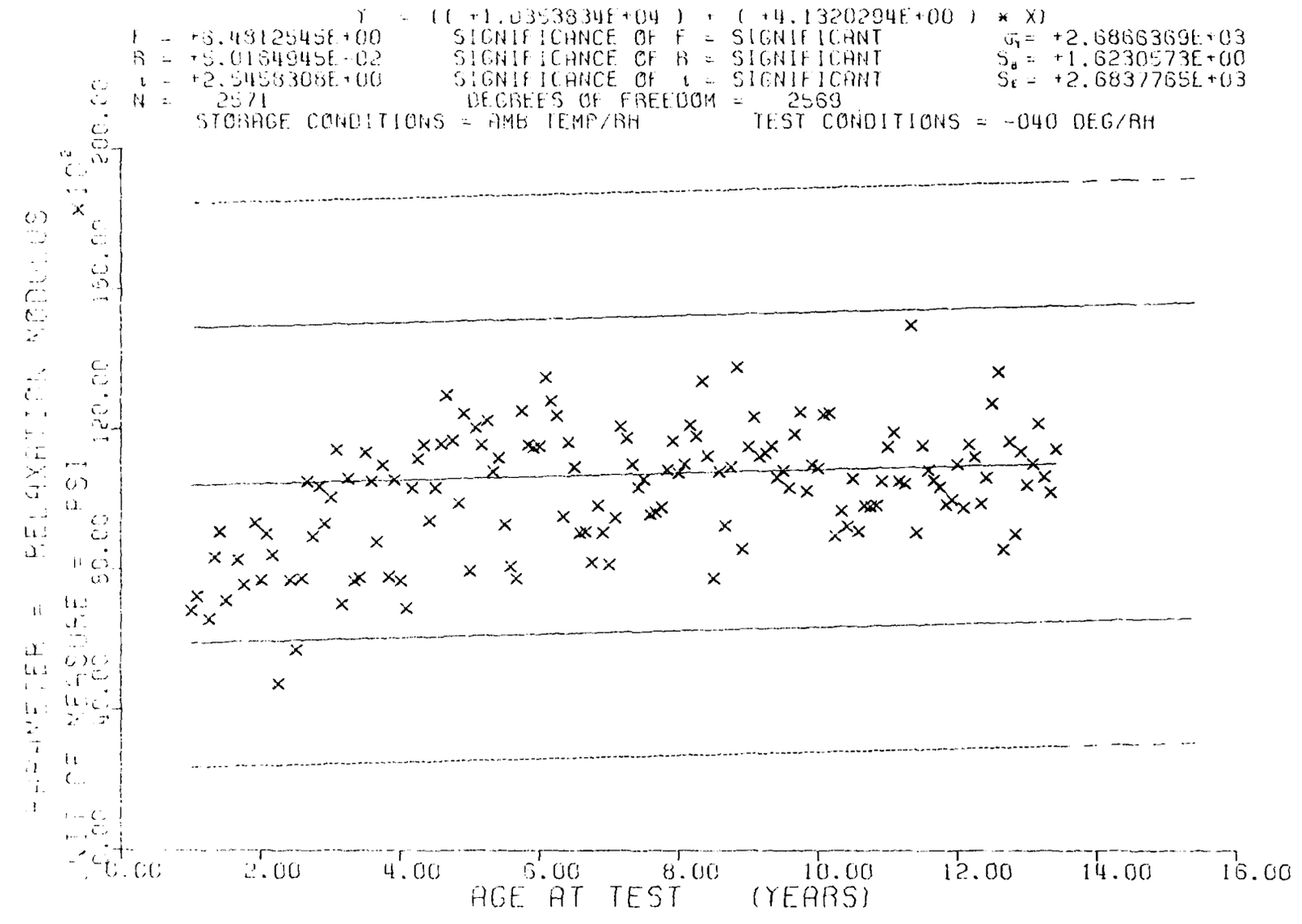

WING G,STRESS RELAXATION MODULUS,0.5% STRAIN,10 SEC,-40 DEG F,TPH-1011

Figure 31




WING 6, STRESS RELAXATION MODULUS, 0.5% STRAIN, 50 SEC, -40 DEG F, TPH-1011

Figure 32




WIDC 6,STRESS RELAXATION MODULUS,0.5% STRAIN,100 SEC,-40 DEG F,TPH-1011

Figure 33

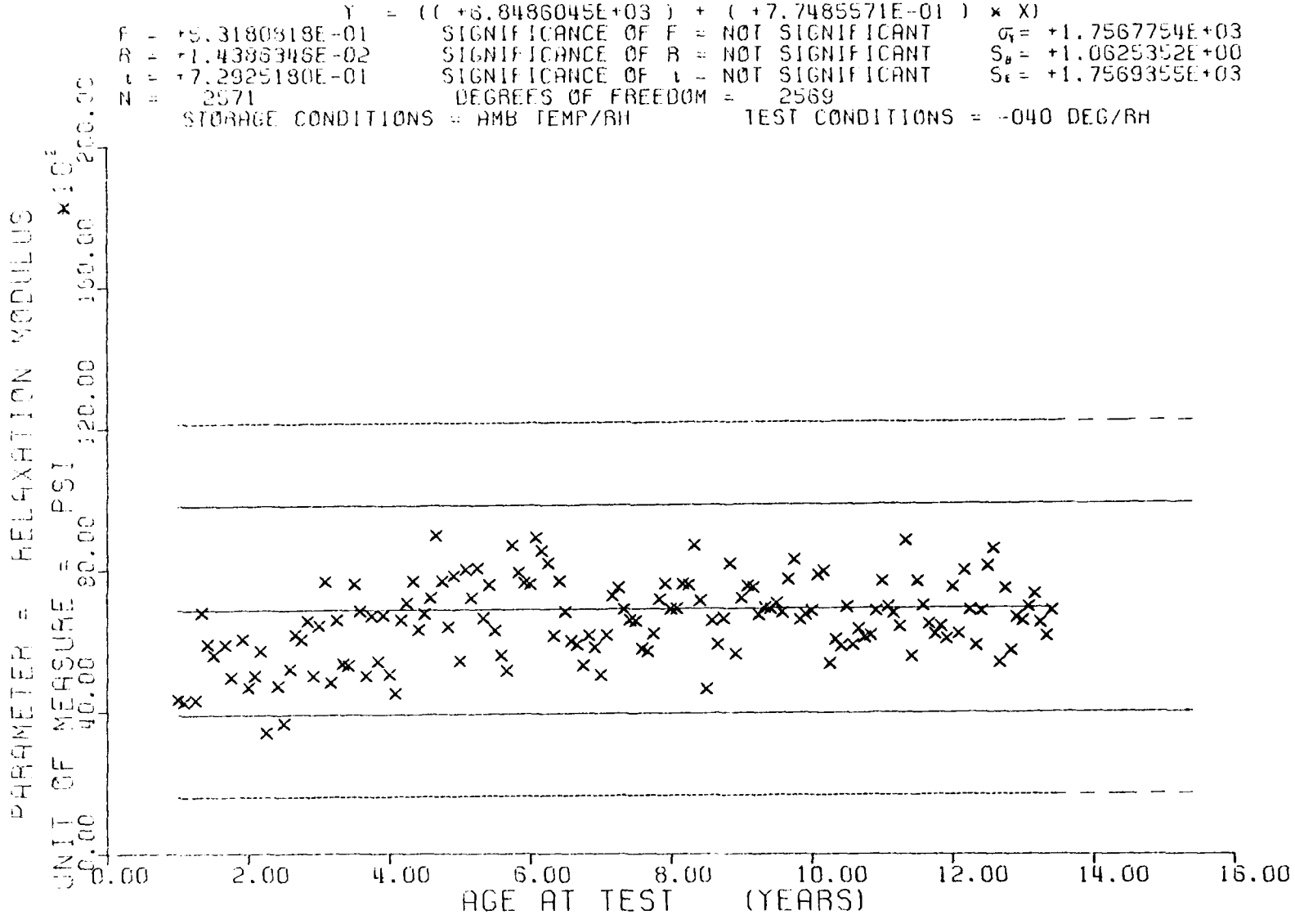

Y = (( +6.8486045E+03 ) + ( +7.7485571E-01 ) × X)
F = +5.3180518E-01 SIGNIFICANCE OF F = NOT SIGNIFICANT σ = +1.7567754E+03
R = +1.4386346E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT S = +1.0625352E+00
t = +7.2925180E-01 SIGNIFICANCE OF t = NOT SIGNIFICANT S = +1.7569355E+03
N = 2571 DEGREES OF FREEDOM = 2569
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = -040 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI
×10³
0.00
40.00
80.00
120.00
160.00
200.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6,STRESS RELAXATION MODULUS,0.5% STRAIN,1000 SEC,-40 DEG F,TPH-1011

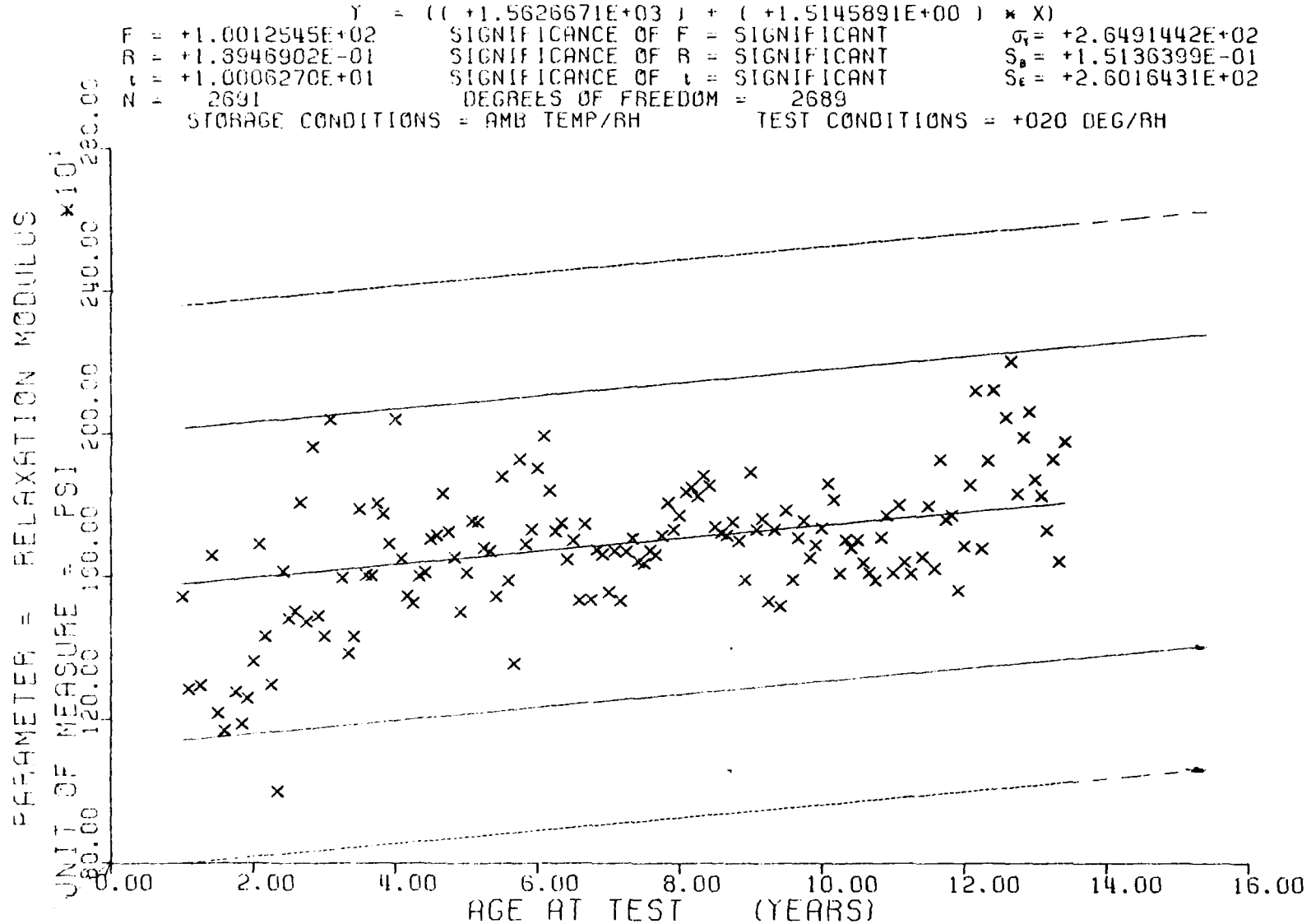
Figure 34

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 3 | 41 | 3 | 66 | 9 | 91 | 21 | 116 | 45 | 142 | 27 |
| 13 | 3 | 42 | 15 | 67 | 10 | 92 | 21 | 117 | 21 | 143 | 23 |
| 15 | 6 | 43 | 9 | 68 | 9 | 93 | 21 | 118 | 21 | 144 | 9 |
| 17 | 7 | 44 | 3 | 69 | 29 | 94 | 21 | 119 | 27 | 145 | 3 |
| 18 | 3 | 45 | 6 | 70 | 24 | 95 | 32 | 120 | 27 | 146 | 6 |
| 19 | 9 | 46 | 6 | 71 | 46 | 96 | 57 | 121 | 21 | 147 | 9 |
| 21 | 9 | 47 | 9 | 72 | 42 | 97 | 57 | 122 | 9 | 148 | 3 |
| 22 | 6 | 48 | 3 | 73 | 24 | 98 | 54 | 123 | 9 | 149 | 12 |
| 23 | 5 | 49 | 6 | 74 | 39 | 99 | 42 | 124 | 23 | 151 | 12 |
| 24 | 6 | 50 | 27 | 75 | 38 | 100 | 21 | 125 | 18 | 152 | 3 |
| 25 | 6 | 51 | 55 | 76 | 26 | 101 | 27 | 126 | 20 | 153 | 6 |
| 26 | 6 | 52 | 48 | 77 | 37 | 102 | 8 | 127 | 11 | 154 | 6 |
| 27 | 6 | 53 | 15 | 78 | 36 | 103 | 21 | 128 | 24 | 155 | 6 |
| 28 | 3 | 54 | 32 | 79 | 18 | 104 | 9 | 129 | 3 | 156 | 6 |
| 29 | 9 | 55 | 18 | 80 | 24 | 105 | 9 | 130 | 33 | 157 | 6 |
| 30 | 3 | 56 | 18 | 81 | 33 | 106 | 3 | 131 | 48 | 158 | 3 |
| 31 | 9 | 57 | 30 | 82 | 27 | 107 | 12 | 132 | 15 | 159 | 3 |
| 32 | 3 | 58 | 18 | 83 | 15 | 108 | 18 | 133 | 6 | 160 | 3 |
| 33 | 12 | 59 | 6 | 84 | 27 | 109 | 9 | 134 | 39 | 161 | 9 |
| 34 | 6 | 60 | 22 | 85 | 12 | 110 | 9 | 135 | 15 | | |
| 35 | 9 | 61 | 21 | 86 | 21 | 111 | 6 | 137 | 15 | | |
| 36 | 24 | 62 | 45 | 87 | 26 | 112 | 36 | 138 | 26 | | |
| 37 | 9 | 63 | 24 | 88 | 24 | 113 | 47 | 139 | 66 | | |
| 38 | 12 | 64 | 27 | 89 | 24 | 114 | 41 | 140 | 6 | | |
| 40 | 3 | 65 | 12 | 90 | 36 | 115 | 45 | 141 | 12 | | |

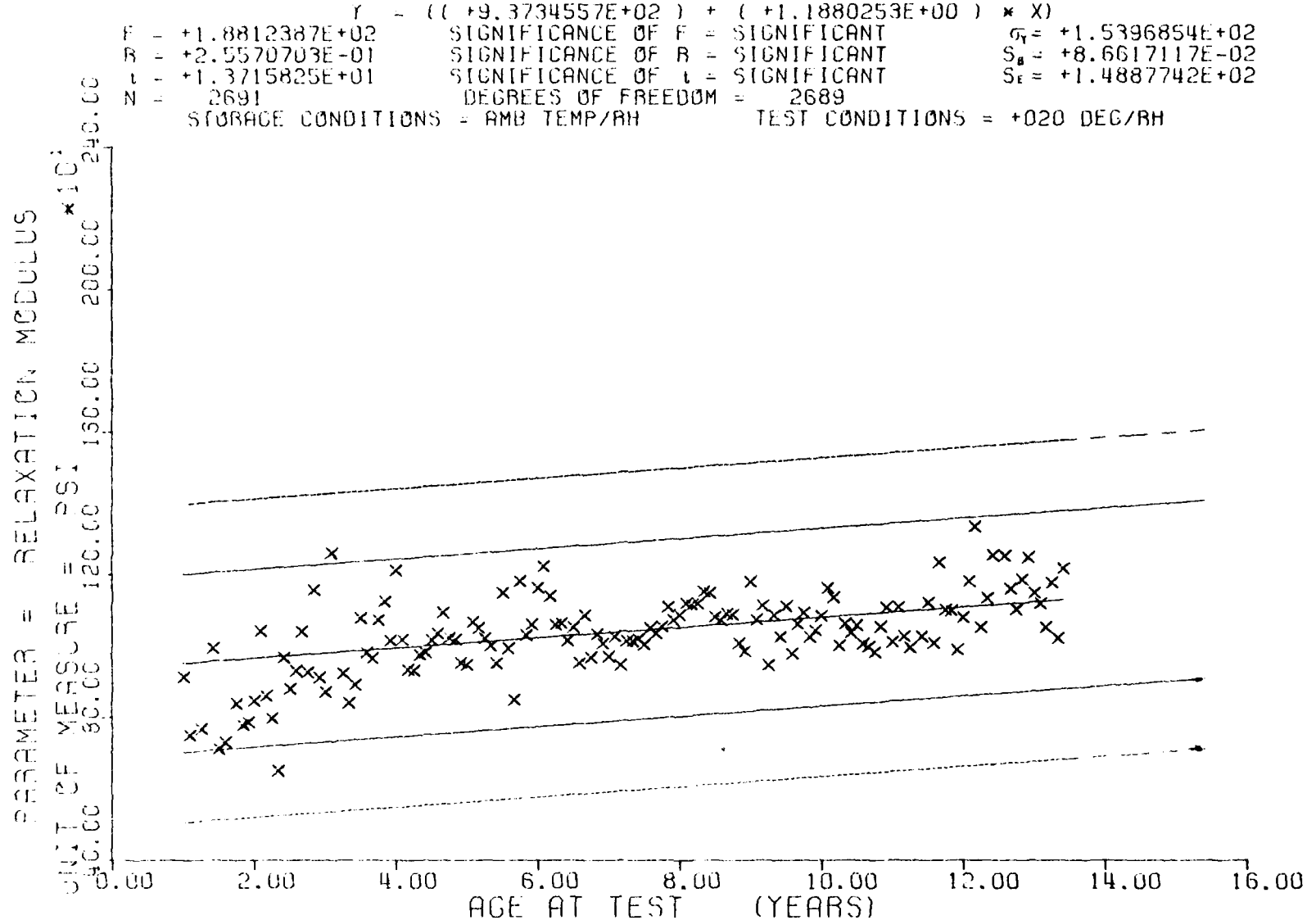
WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,1000 SEC, 20 DEG F,TPH-1011

This sample size summary is applicable to figures 35 thru38



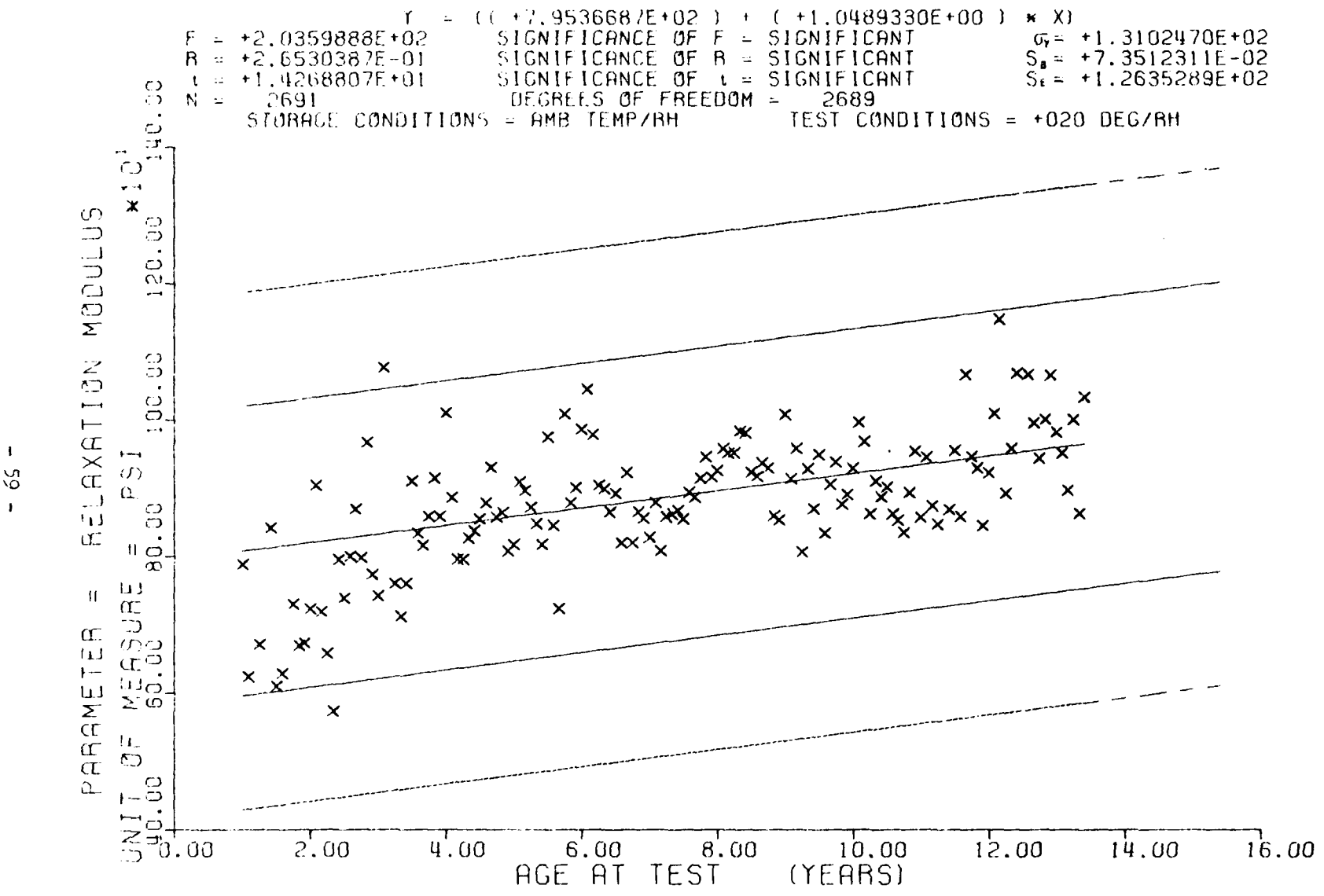

WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,10 SEC, 20 DEG F,TPH-1011

Figure 35



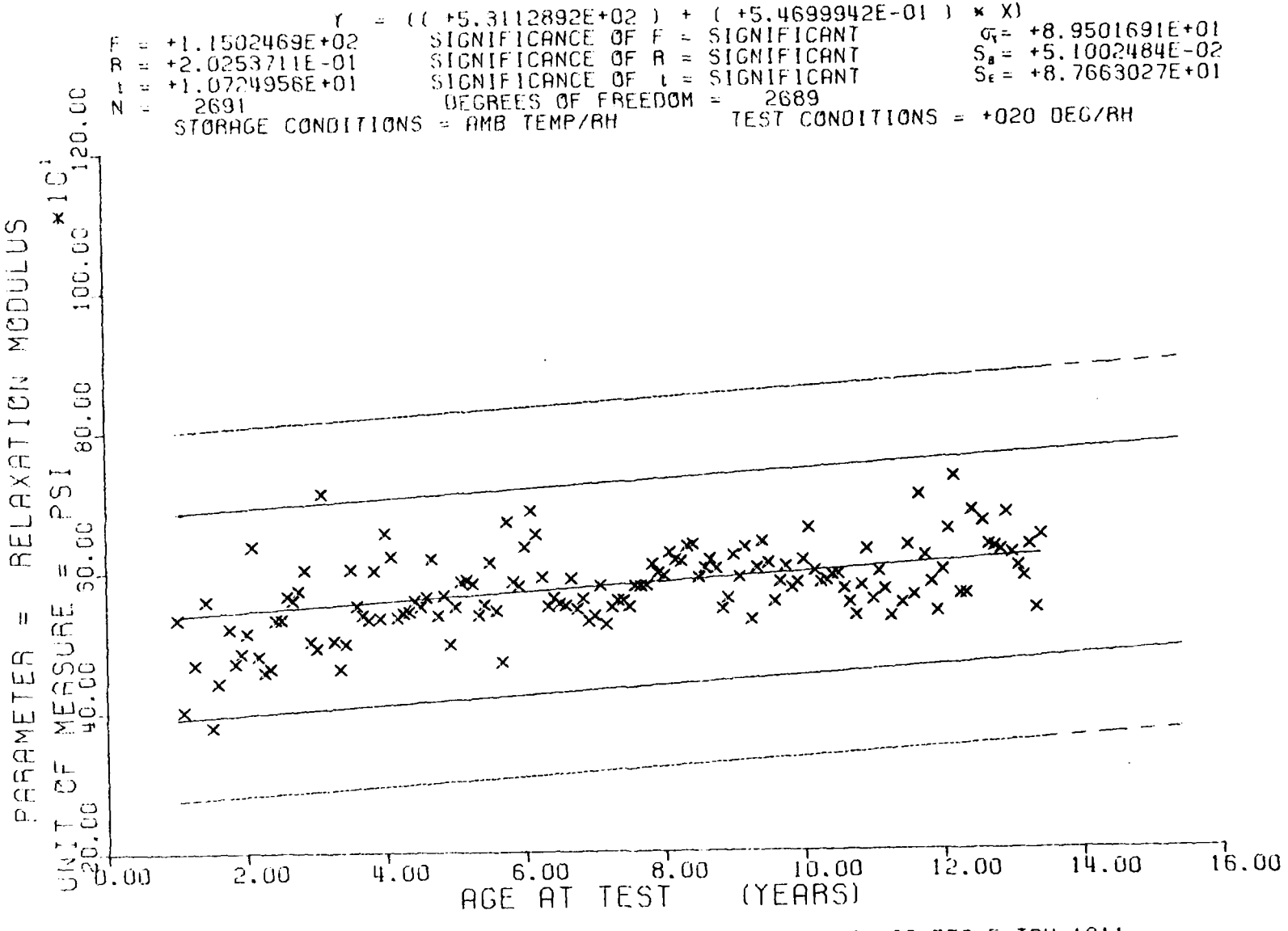

WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC, 20 DEG F, TPH-1011

Figure 36




WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,100 SEC, 20 DEG F,TPH-1011

Figure 37




WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 20 DEG F, TPH-1011

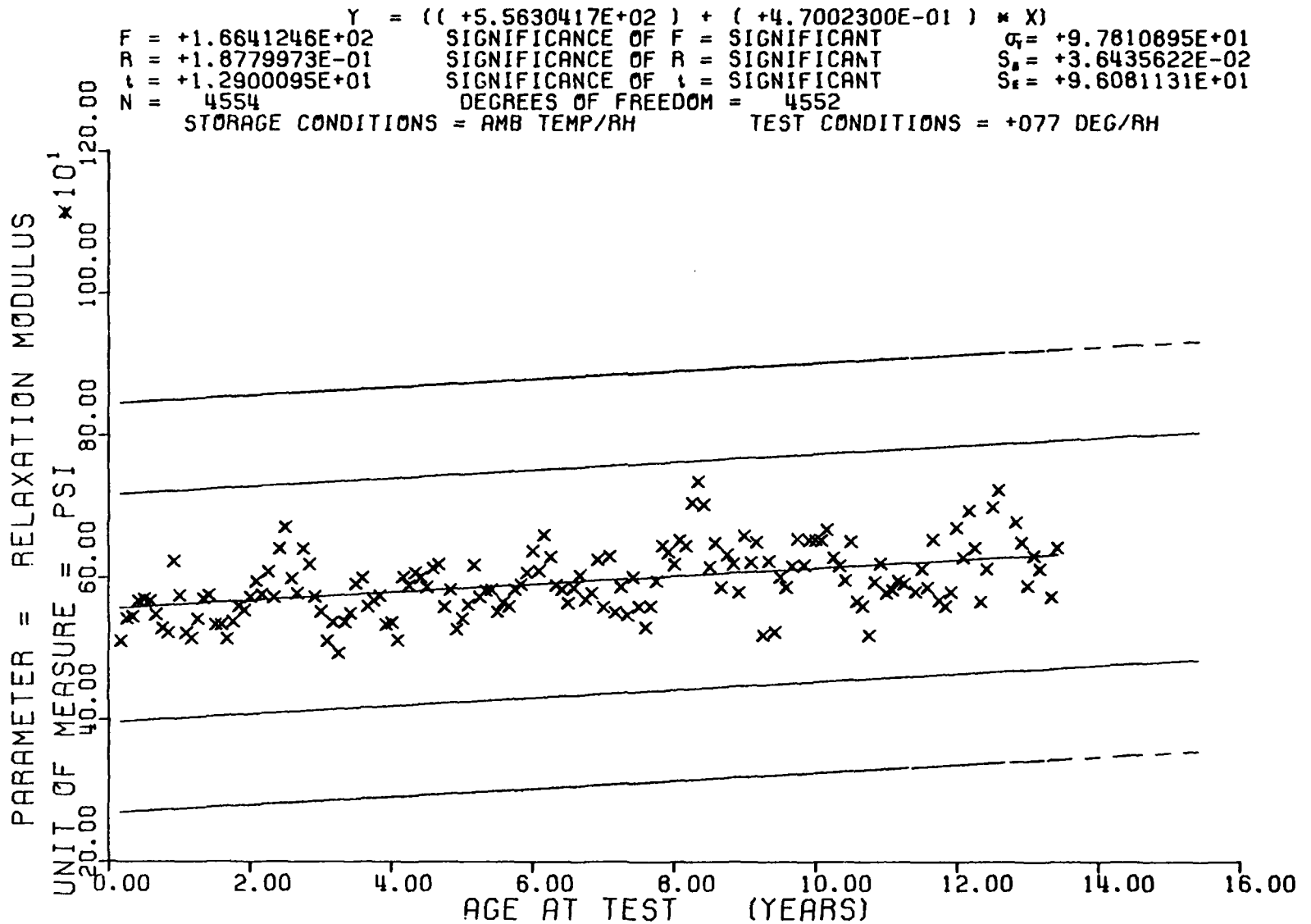
Figure 38

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 3 | 27 | 24 | 52 | 72 | 77 | 33 | 102 | 15 | 127 | 15 |
| 3 | 6 | 28 | 27 | 53 | 18 | 78 | 39 | 103 | 26 | 128 | 24 |
| 4 | 18 | 29 | 48 | 54 | 39 | 79 | 21 | 104 | 12 | 129 | 3 |
| 5 | 22 | 30 | 43 | 55 | 22 | 80 | 21 | 105 | 6 | 130 | 42 |
| 6 | 21 | 31 | 30 | 56 | 36 | 81 | 45 | 106 | 3 | 131 | 42 |
| 7 | 35 | 32 | 60 | 57 | 51 | 82 | 21 | 107 | 10 | 132 | 14 |
| 8 | 30 | 33 | 29 | 58 | 45 | 83 | 15 | 108 | 24 | 133 | 9 |
| 9 | 45 | 34 | 51 | 59 | 39 | 84 | 21 | 109 | 9 | 134 | 36 |
| 10 | 39 | 35 | 36 | 60 | 74 | 85 | 15 | 110 | 9 | 135 | 15 |
| 11 | 47 | 36 | 58 | 61 | 66 | 86 | 21 | 111 | 9 | 137 | 15 |
| 12 | 65 | 37 | 18 | 62 | 82 | 87 | 36 | 112 | 30 | 138 | 45 |
| 13 | 51 | 38 | 24 | 63 | 63 | 88 | 21 | 113 | 56 | 139 | 48 |
| 14 | 46 | 39 | 42 | 64 | 51 | 89 | 30 | 114 | 44 | 140 | 9 |
| 15 | 57 | 40 | 18 | 65 | 36 | 90 | 42 | 115 | 27 | 141 | 12 |
| 16 | 36 | 41 | 24 | 66 | 39 | 91 | 14 | 116 | 65 | 142 | 27 |
| 17 | 46 | 42 | 12 | 67 | 33 | 92 | 23 | 117 | 18 | 143 | 30 |
| 18 | 13 | 43 | 9 | 68 | 51 | 93 | 19 | 118 | 21 | 144 | 6 |
| 19 | 10 | 44 | 9 | 69 | 75 | 94 | 18 | 119 | 21 | 145 | 3 |
| 20 | 4 | 45 | 6 | 70 | 99 | 95 | 33 | 120 | 33 | 146 | 6 |
| 21 | 27 | 46 | 18 | 71 | 62 | 96 | 57 | 121 | 15 | 147 | 9 |
| 22 | 9 | 47 | 30 | 72 | 51 | 97 | 69 | 122 | 9 | 148 | 3 |
| 23 | 6 | 48 | 36 | 73 | 33 | 98 | 60 | 123 | 9 | 149 | 6 |
| 24 | 34 | 49 | 42 | 74 | 48 | 99 | 39 | 124 | 24 | 150 | 6 |
| 25 | 27 | 50 | 30 | 75 | 39 | 100 | 20 | 125 | 18 | 151 | 12 |
| 26 | 30 | 51 | 81 | 76 | 27 | 101 | 34 | 126 | 22 | 154 | 9 |
| | | | | | | | | | | 155 | 3 |
| | | | | | | | | | | 156 | 6 |
| | | | | | | | | | | 157 | 6 |
| | | | | | | | | | | 158 | 6 |
| | | | | | | | | | | 160 | 3 |
| | | | | | | | | | | 161 | 9 |

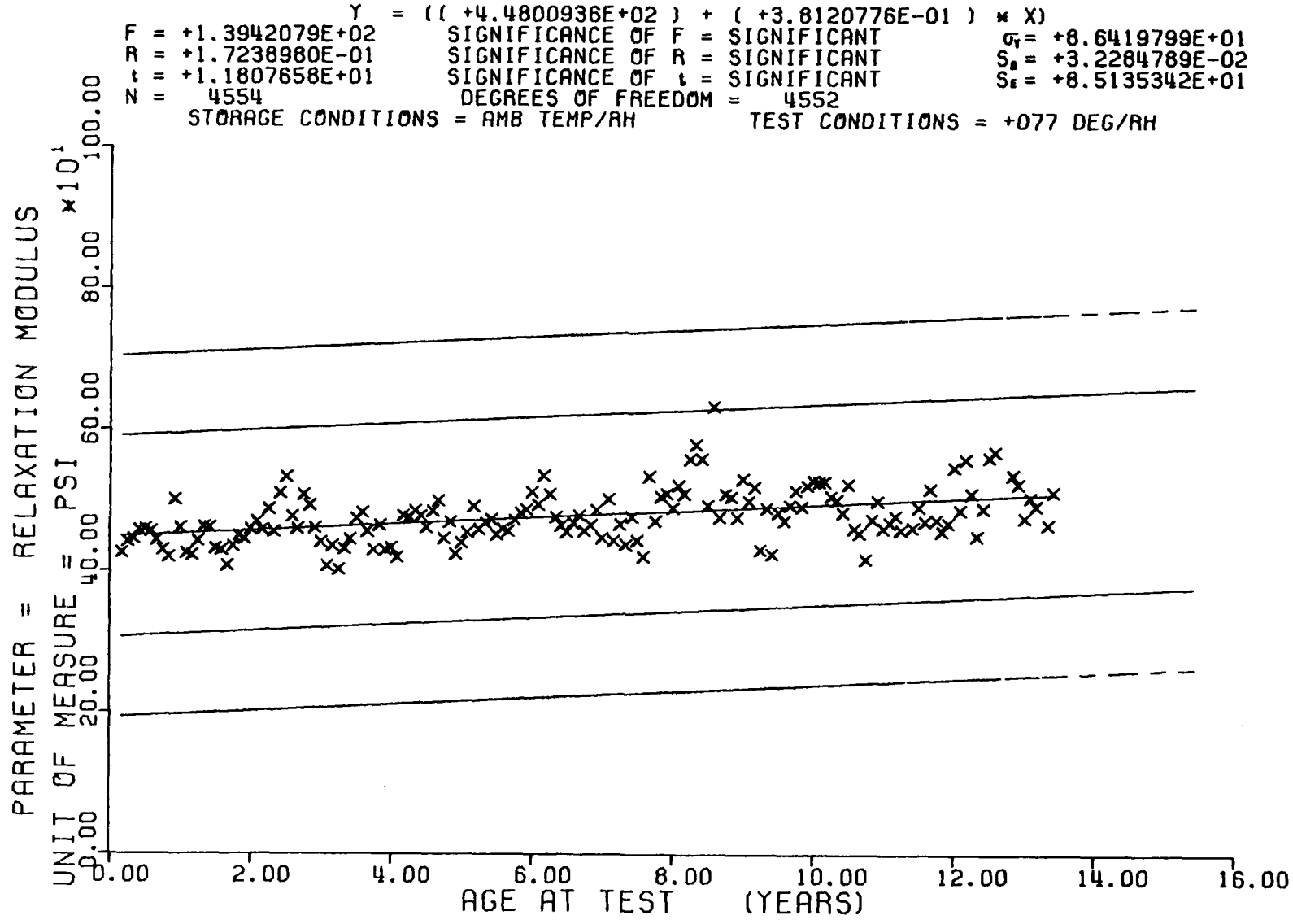
WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,1000 SEC, 77 DEG F,TPH-1011

This sample size summary is applicable to figures 39 thru 42



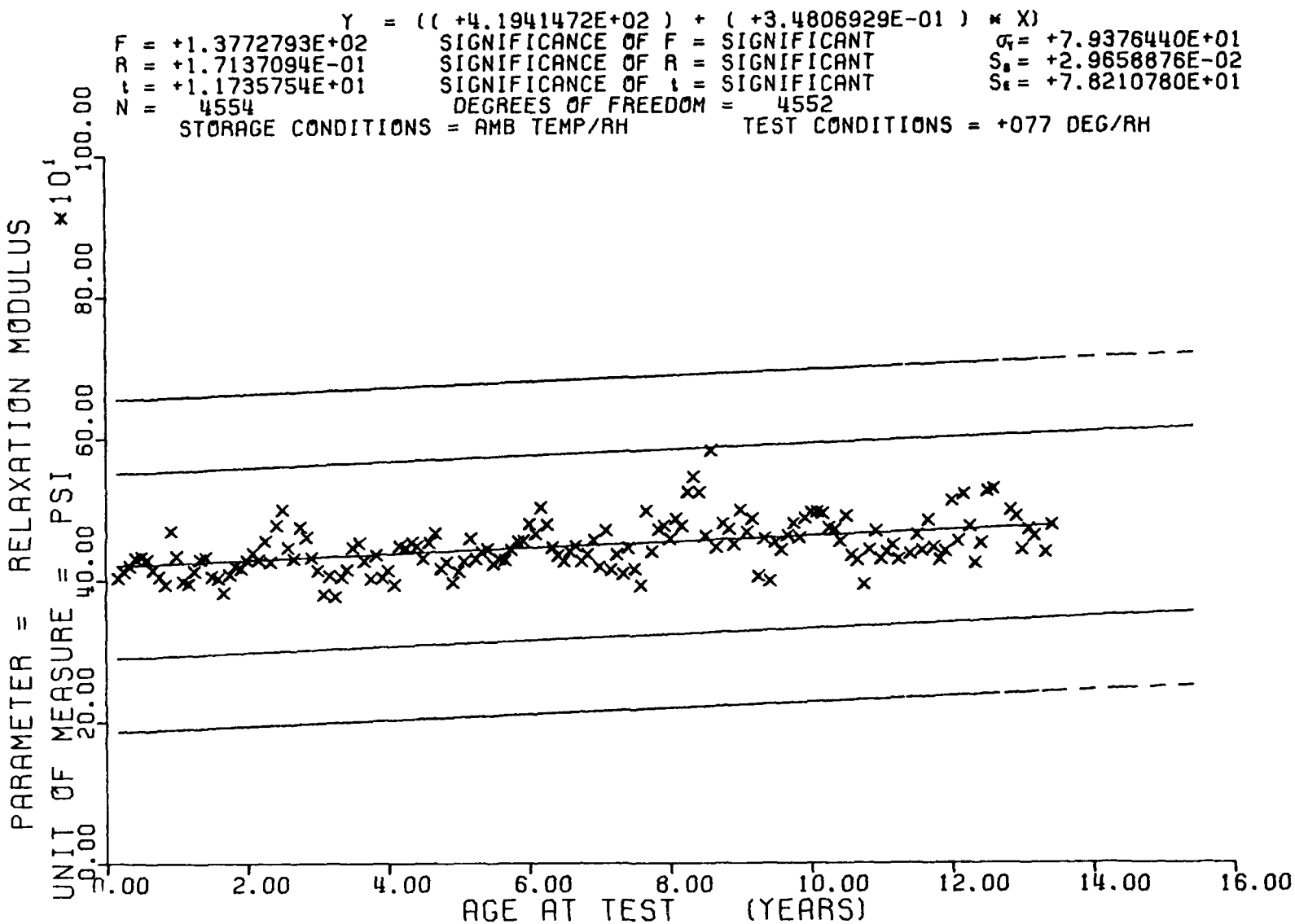

WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 77 DEG F, TPH-1011

Figure 39



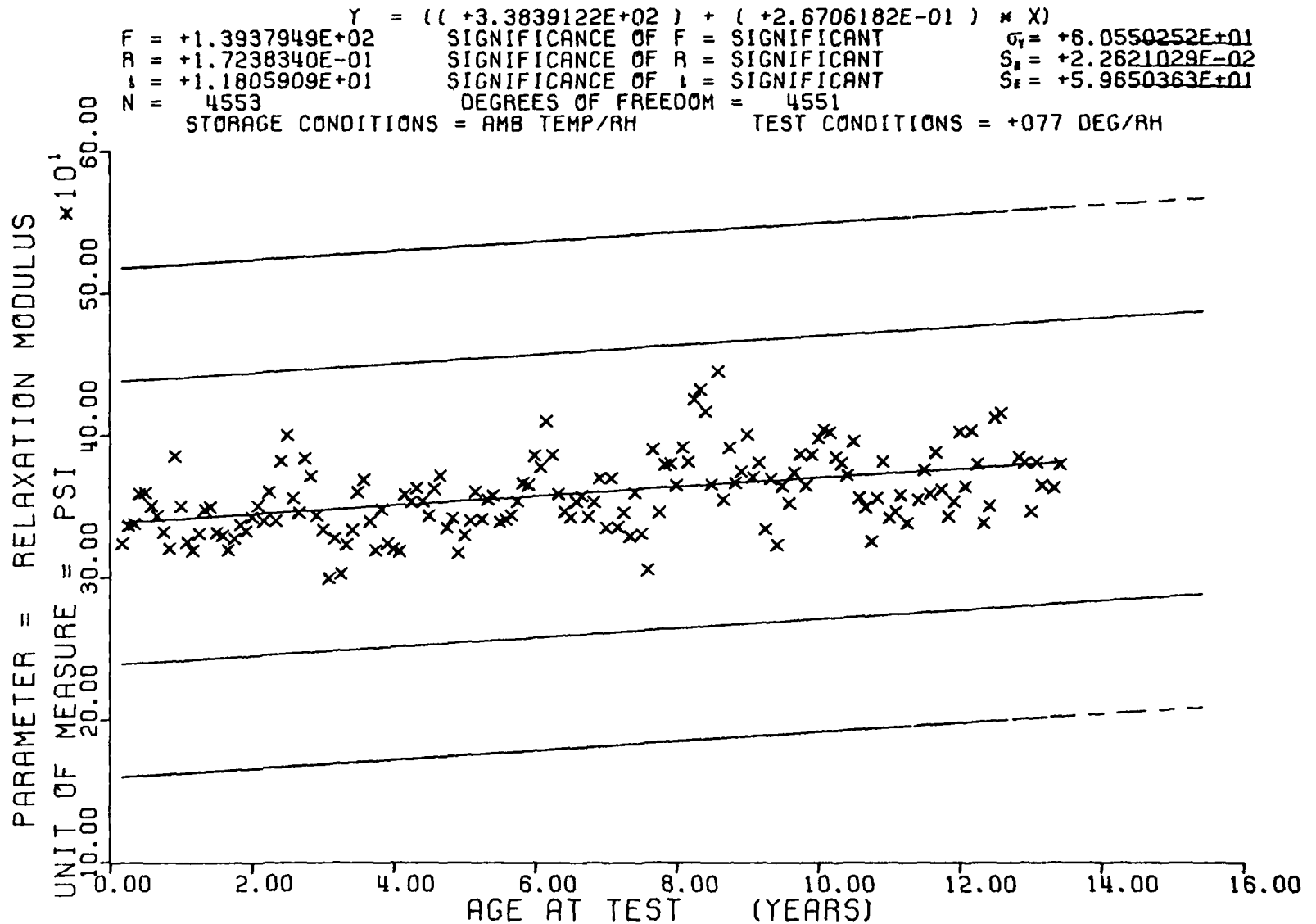

WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC, 77 DEG F, TPH-1011

Figure 40




WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC, 77 DEG F, TPH-1011

Figure 41




WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 77 DEG F, TPH-1011

Figure 42

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | 3 | 43 | 9 | 68 | 12 | 93 | 21 | 118 | 21 | 143 | 27 |
| 13 | 3 | 44 | 3 | 69 | 24 | 94 | 21 | 119 | 21 | 144 | 12 |
| 15 | 6 | 45 | 9 | 70 | 27 | 95 | 27 | 120 | 33 | 145 | 3 |
| 17 | 15 | 46 | 6 | 71 | 48 | 96 | 60 | 121 | 18 | 146 | 6 |
| 18 | 6 | 47 | 9 | 72 | 42 | 97 | 57 | 122 | 9 | 147 | 9 |
| 20 | 3 | 48 | 3 | 73 | 24 | 98 | 60 | 123 | 12 | 148 | 3 |
| 21 | 9 | 49 | 6 | 74 | 42 | 99 | 39 | 124 | 21 | 149 | 9 |
| 22 | 6 | 50 | 27 | 75 | 36 | 100 | 21 | 125 | 15 | 150 | 6 |
| 23 | 3 | 51 | 57 | 76 | 29 | 101 | 24 | 126 | 24 | 151 | 12 |
| 24 | 6 | 52 | 45 | 77 | 33 | 102 | 9 | 127 | 14 | 152 | 3 |
| 25 | 9 | 53 | 12 | 78 | 36 | 103 | 21 | 128 | 21 | 154 | 9 |
| 26 | 9 | 54 | 28 | 79 | 18 | 104 | 9 | 129 | 3 | 155 | 3 |
| 28 | 3 | 55 | 27 | 80 | 24 | 105 | 9 | 130 | 42 | 156 | 6 |
| 29 | 9 | 56 | 27 | 81 | 39 | 106 | 3 | 131 | 42 | 157 | 6 |
| 30 | 9 | 57 | 31 | 82 | 27 | 107 | 8 | 132 | 9 | 158 | 6 |
| 31 | 3 | 58 | 24 | 83 | 18 | 108 | 21 | 133 | 9 | 160 | 3 |
| 32 | 9 | 59 | 12 | 84 | 21 | 109 | 9 | 134 | 36 | 161 | 9 |
| 33 | 9 | 60 | 15 | 85 | 12 | 110 | 9 | 135 | 12 | | |
| 35 | 15 | 61 | 27 | 86 | 18 | 111 | 9 | 136 | 6 | | |
| 36 | 33 | 62 | 48 | 87 | 18 | 112 | 33 | 137 | 18 | | |
| 37 | 6 | 63 | 21 | 88 | 14 | 113 | 45 | 138 | 51 | | |
| 38 | 9 | 64 | 33 | 89 | 15 | 114 | 44 | 139 | 51 | | |
| 40 | 9 | 65 | 9 | 90 | 30 | 115 | 27 | 140 | 15 | | |
| 41 | 12 | 66 | 12 | 91 | 24 | 116 | 30 | 141 | 18 | | |
| 42 | 6 | 67 | 6 | 92 | 24 | 117 | 21 | 142 | 27 | | |

WING C,STRESS RELAXATION MODULUS,3.0% STRAIN,1000 SEC,100 DEG F,TPH-1011

This sample size summary is applicable to figures 43 thru 46

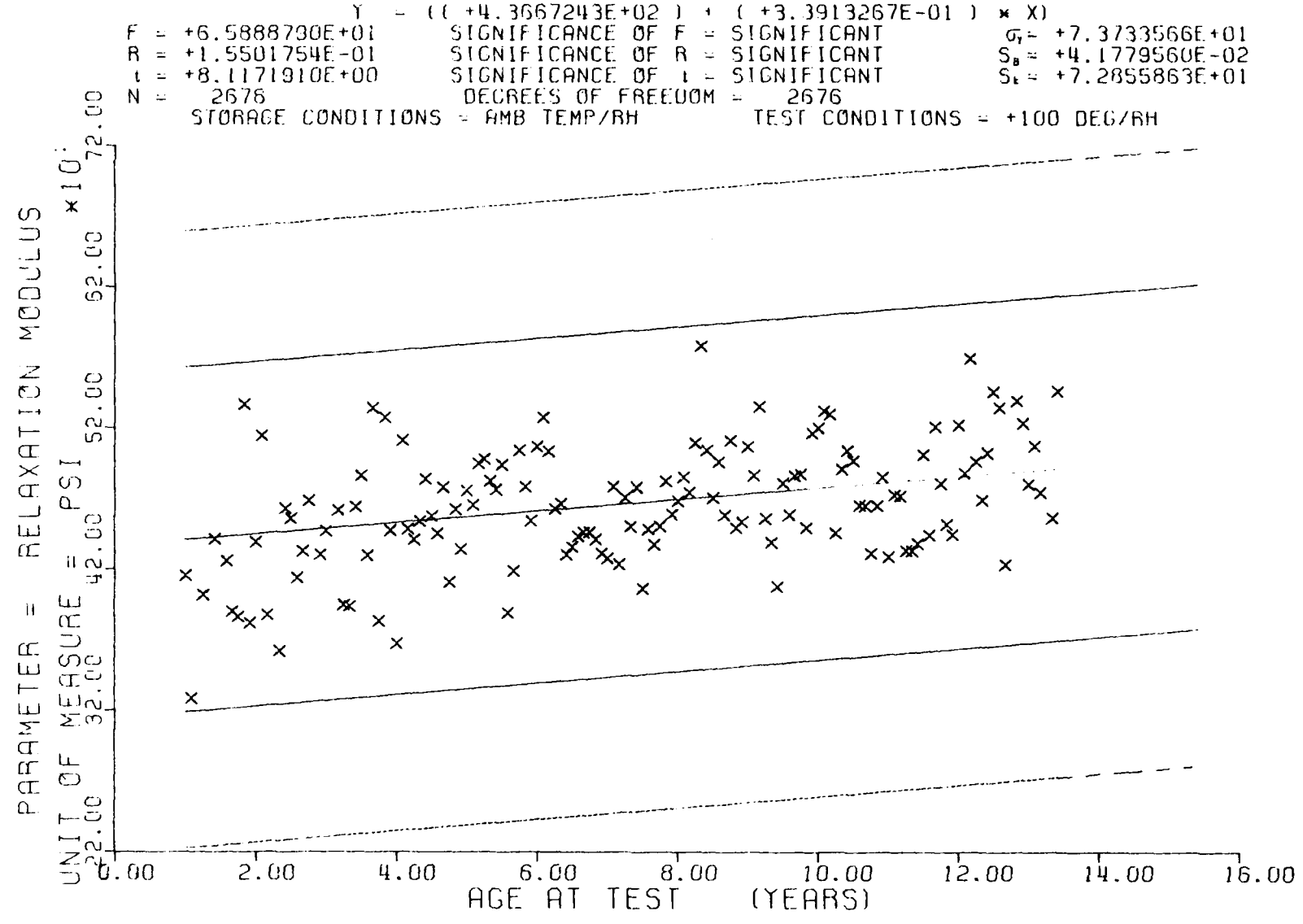
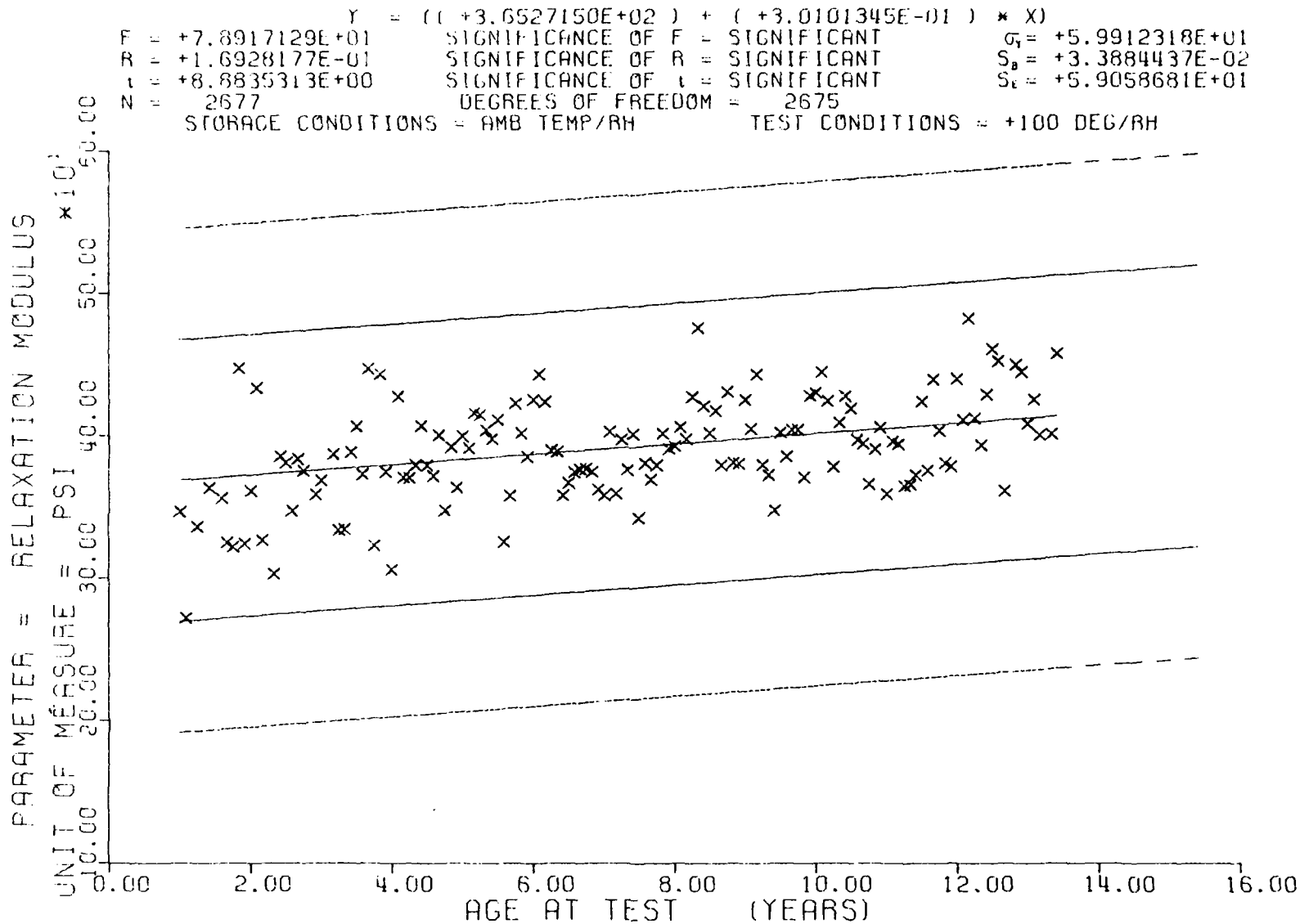
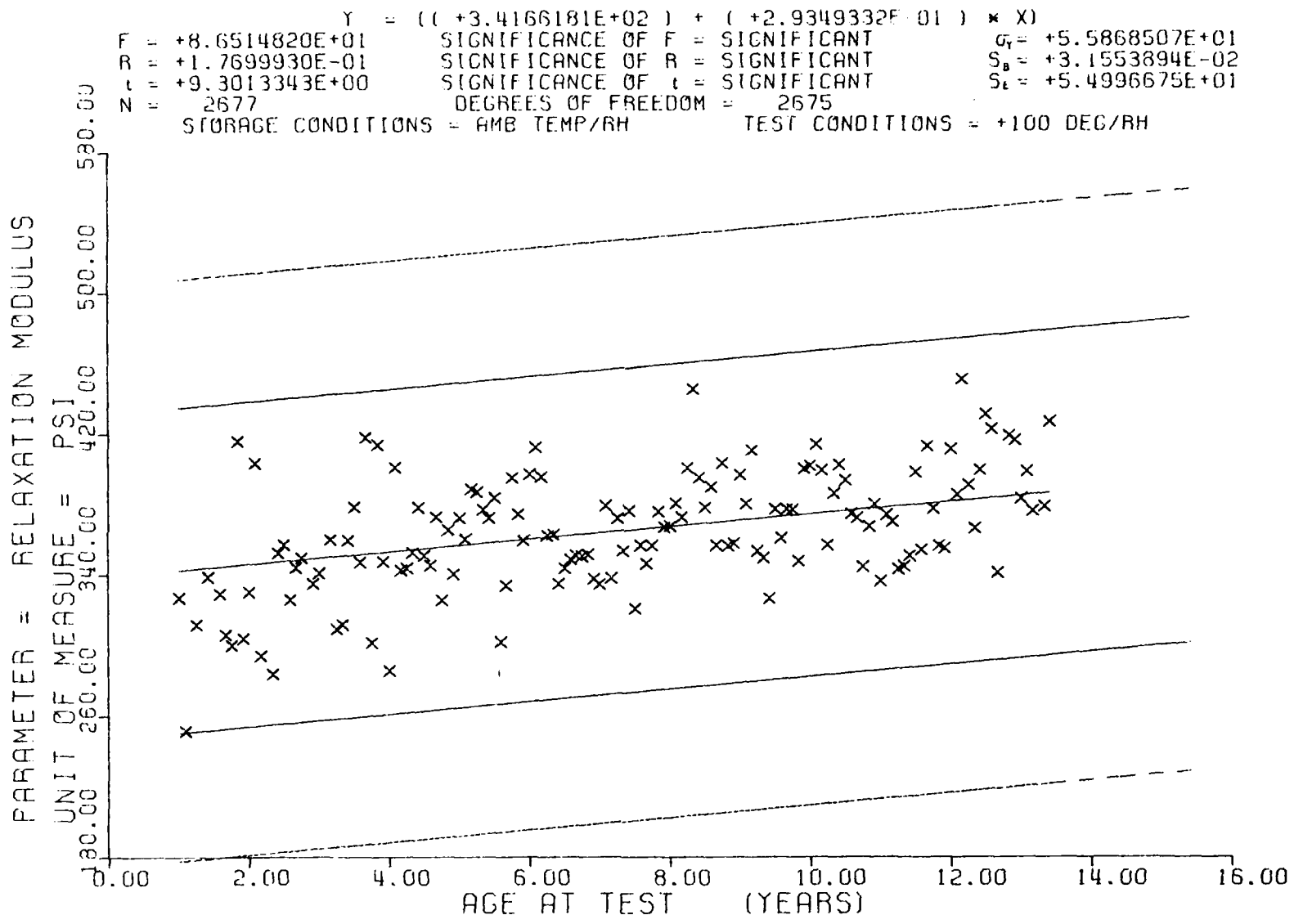

Y = (( +4.3667243E+02 ) + ( +3.3913267E-01 ) * X)
F = +6.5888730E+01 SIGNIFICANCE OF F = SIGNIFICANT σ = +7.3733566E+01
R = +1.5501754E-01 SIGNIFICANCE OF R = SIGNIFICANT S_B = +4.1779560E-02
t = +8.1171910E+00 SIGNIFICANCE OF t = SIGNIFICANT S_t = +7.2855863E+01
N = 2676 DEGREES OF FREEDOM = 2676
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +100 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI *10^
72.00
62.00
52.00
42.00
32.00
22.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 100 DEG F, TPH-1011

Figure 43



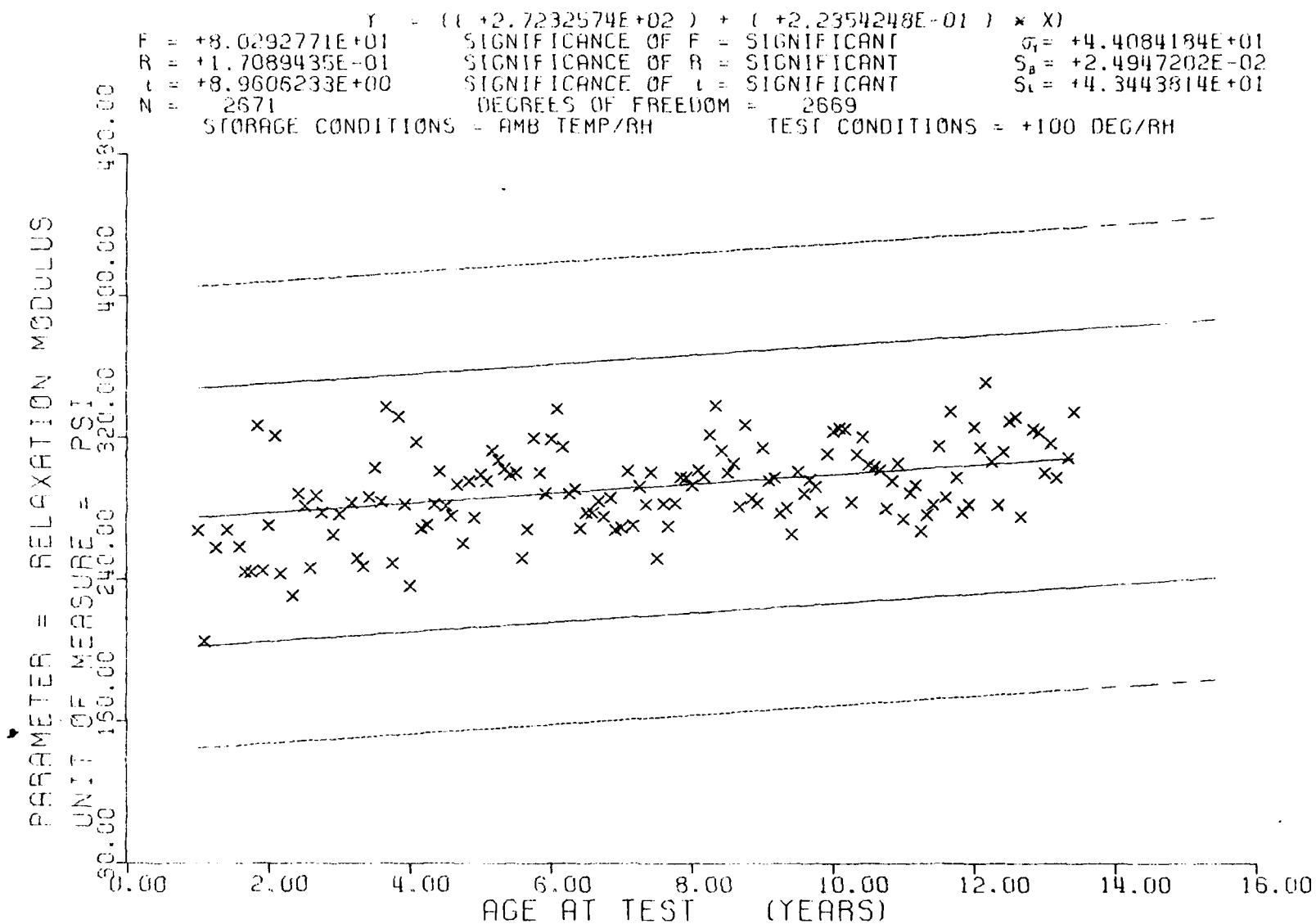

WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC. 100 DEG F, TPH-1011

Figure 44




WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC, 100 DEG F, TPH-1011

Figure 45




WING G, STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 100 DEG F, TPH-1011

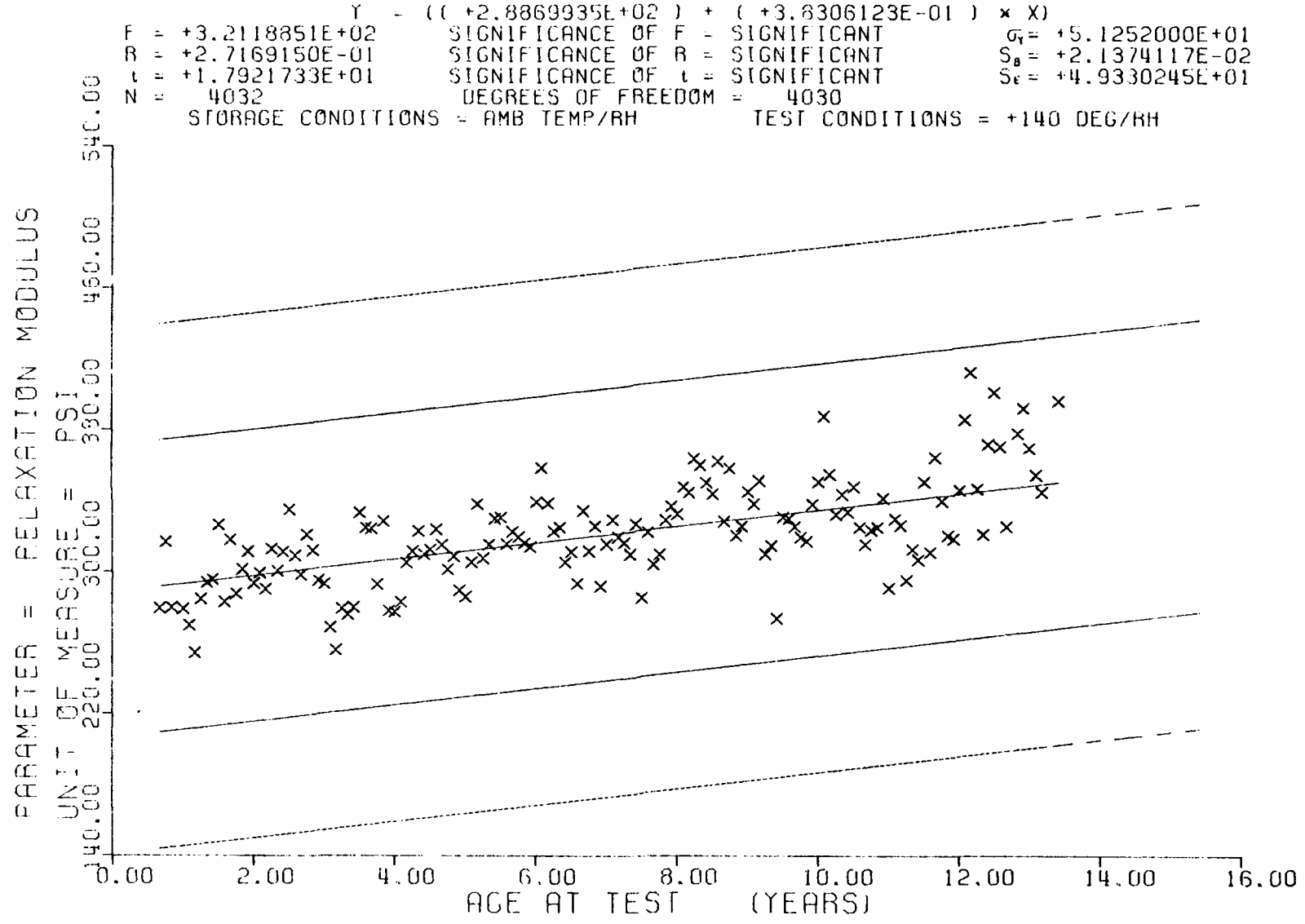
Figure 46

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 3 | 34 | 57 | 59 | 42 | 84 | 21 | 109 | 9 | 134 | 36 |
| 9 | 9 | 35 | 36 | 60 | 65 | 85 | 12 | 110 | 12 | 135 | 12 |
| 10 | 6 | 36 | 51 | 61 | 75 | 86 | 18 | 111 | 9 | 136 | 6 |
| 12 | 24 | 37 | 21 | 62 | 72 | 87 | 24 | 112 | 30 | 137 | 18 |
| 13 | 27 | 39 | 18 | 63 | 60 | 88 | 15 | 113 | 45 | 138 | 42 |
| 14 | 9 | 39 | 48 | 64 | 57 | 89 | 21 | 114 | 44 | 139 | 54 |
| 15 | 27 | 40 | 18 | 65 | 33 | 90 | 24 | 115 | 24 | 140 | 6 |
| 16 | 15 | 41 | 21 | 66 | 45 | 91 | 27 | 116 | 33 | 141 | 15 |
| 17 | 39 | 42 | 15 | 67 | 30 | 92 | 18 | 117 | 21 | 142 | 27 |
| 18 | 12 | 43 | 9 | 68 | 48 | 93 | 24 | 118 | 27 | 143 | 30 |
| 19 | 6 | 44 | 9 | 69 | 78 | 94 | 24 | 119 | 21 | 144 | 9 |
| 20 | 6 | 45 | 3 | 70 | 84 | 95 | 26 | 120 | 30 | 145 | 3 |
| 21 | 18 | 46 | 12 | 71 | 69 | 96 | 60 | 121 | 21 | 146 | 6 |
| 22 | 6 | 47 | 30 | 72 | 54 | 97 | 54 | 122 | 9 | 147 | 9 |
| 23 | 9 | 48 | 39 | 73 | 33 | 98 | 58 | 123 | 12 | 148 | 3 |
| 24 | 13 | 49 | 39 | 74 | 44 | 99 | 39 | 124 | 21 | 149 | 9 |
| 25 | 30 | 50 | 36 | 75 | 33 | 100 | 21 | 125 | 15 | 150 | 6 |
| 26 | 30 | 51 | 66 | 76 | 36 | 101 | 21 | 126 | 24 | 151 | 12 |
| 27 | 21 | 52 | 69 | 77 | 36 | 102 | 8 | 127 | 14 | 152 | 3 |
| 28 | 27 | 53 | 27 | 78 | 36 | 103 | 21 | 128 | 18 | 154 | 9 |
| 29 | 48 | 54 | 30 | 79 | 17 | 104 | 5 | 129 | 2 | 155 | 3 |
| 30 | 45 | 55 | 33 | 80 | 23 | 105 | 9 | 130 | 36 | 156 | 6 |
| 31 | 33 | 56 | 42 | 81 | 33 | 106 | 3 | 131 | 48 | 157 | 6 |
| 32 | 57 | 57 | 51 | 82 | 27 | 107 | 6 | 132 | 9 | 158 | 6 |
| 33 | 27 | 58 | 57 | 83 | 18 | 108 | 24 | 133 | 12 | 161 | 12 |

WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,1000 SEC,140 DEG F,TPH-1011

This sample size summary is applicable to figures 47 thru 50




WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 140 DEG F, TPH-1011

Figure 47

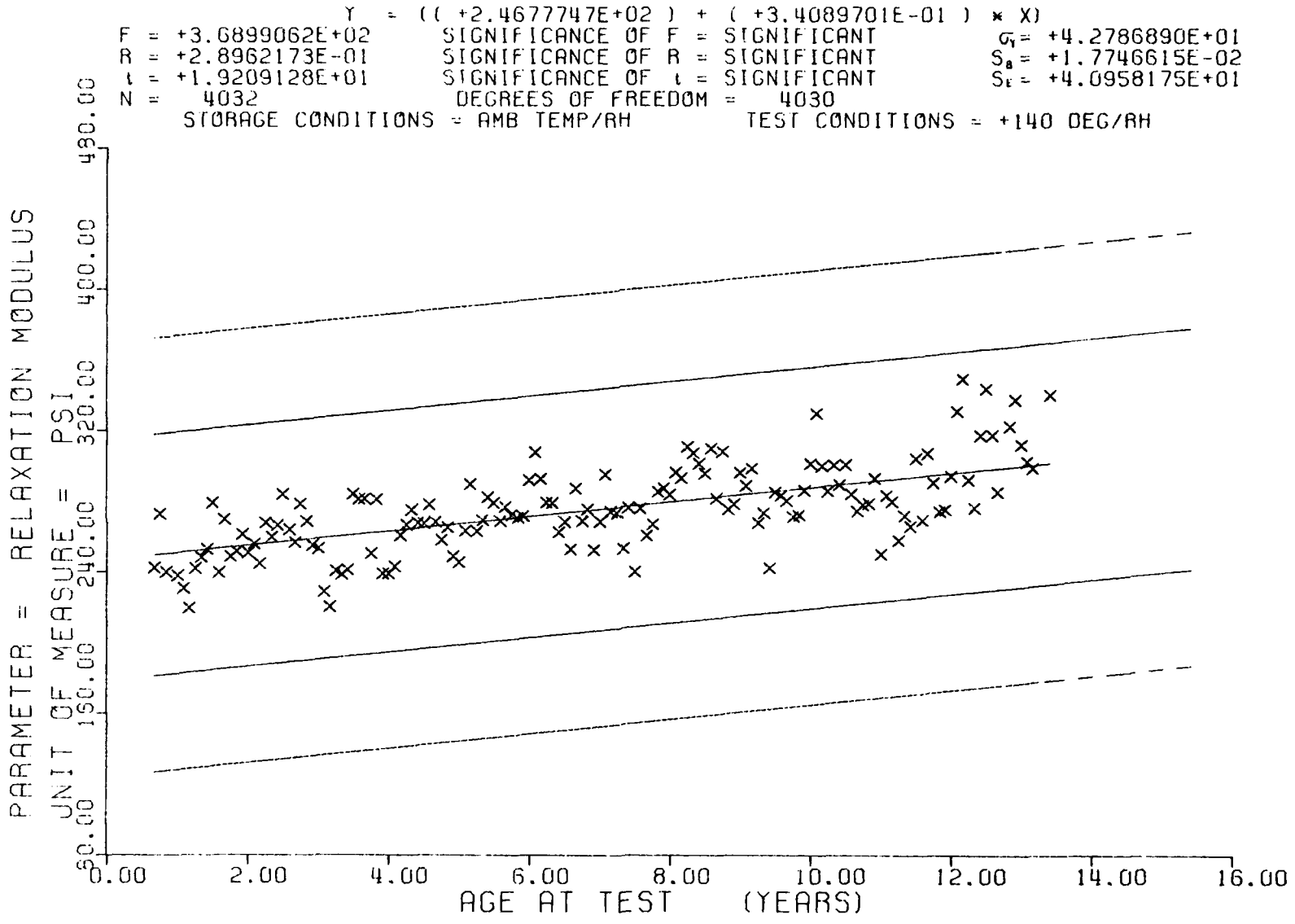
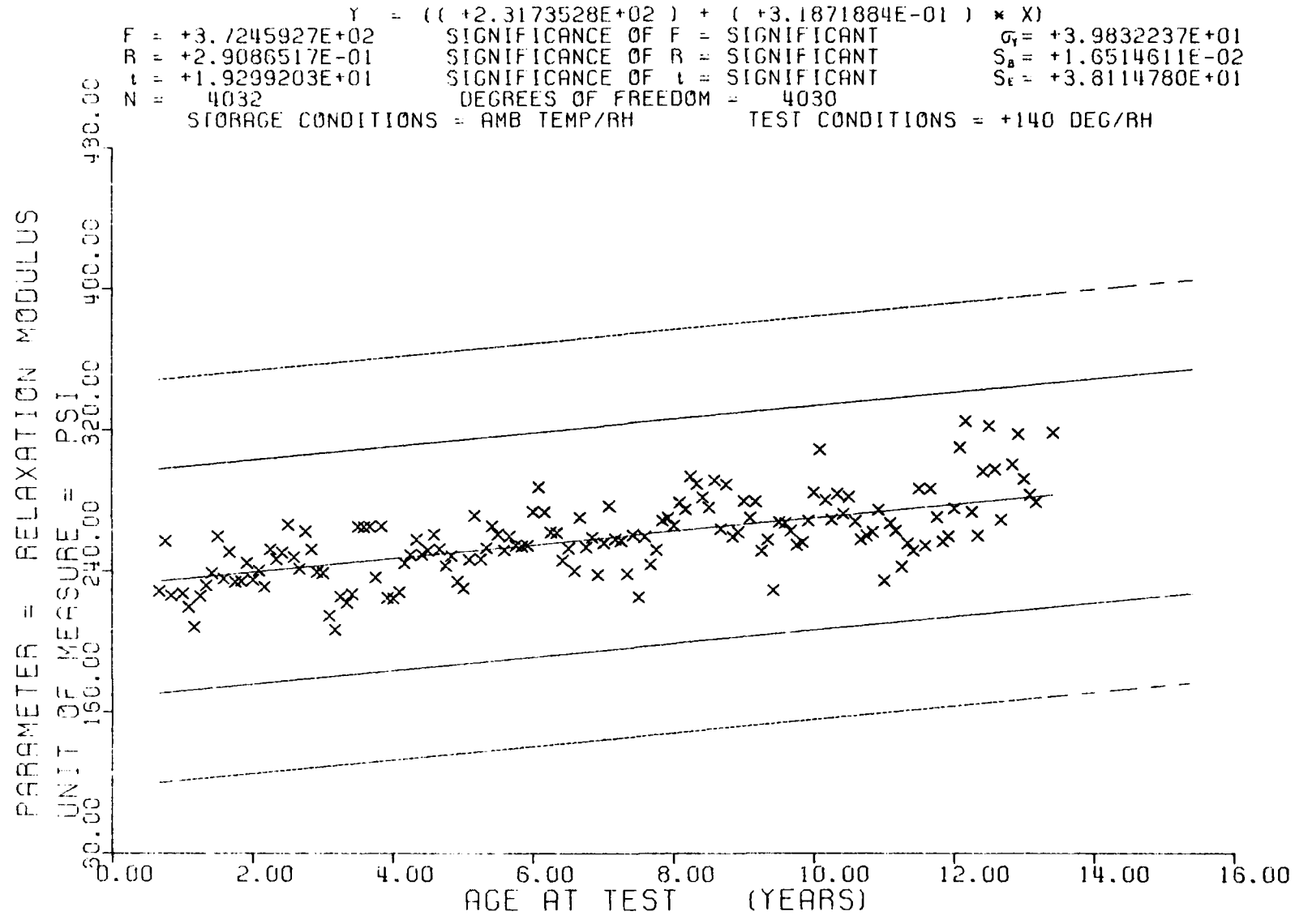
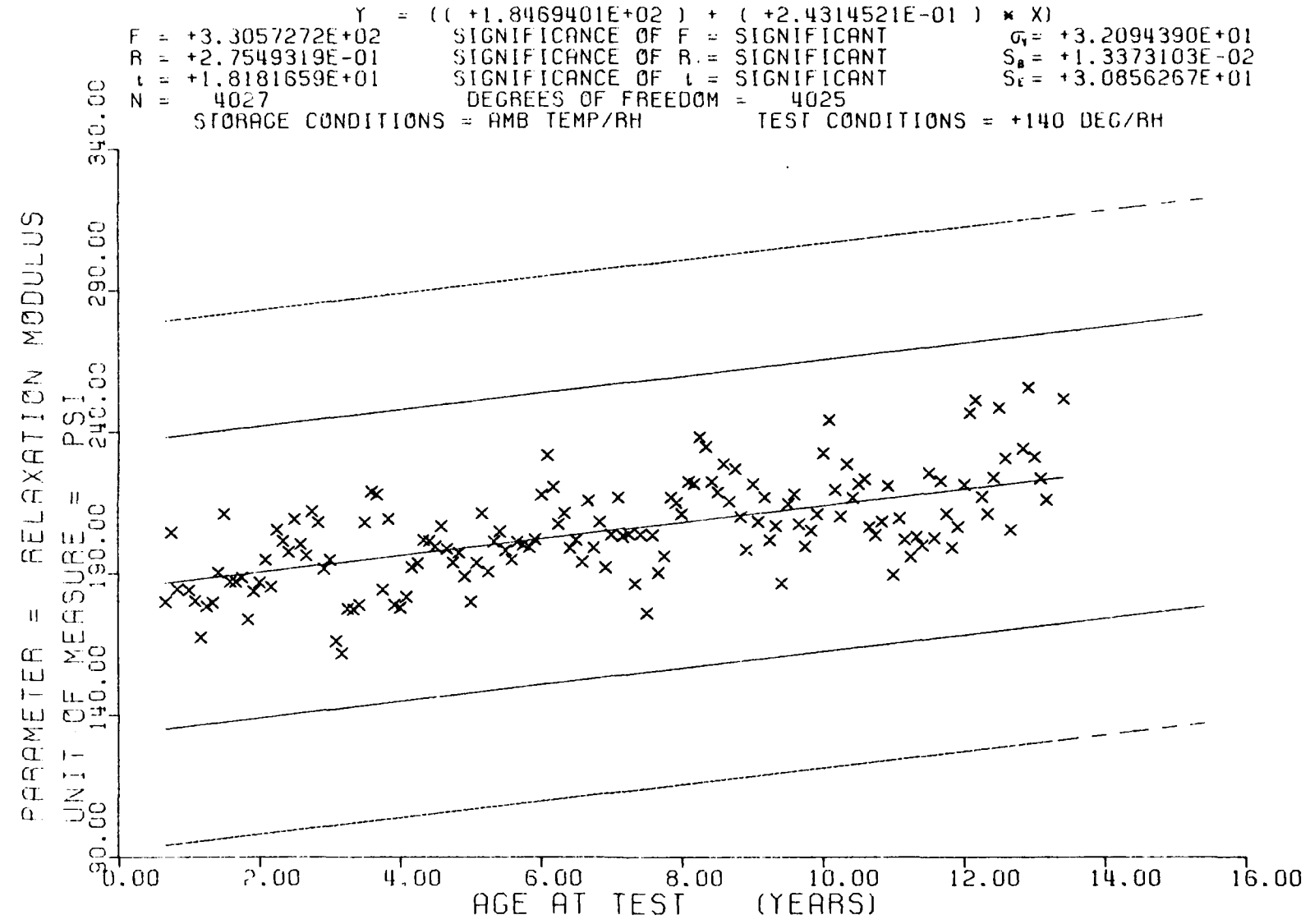

Y = (( +2.4677747E+02 ) + ( +3.4089701E-01 ) * X)
F = +3.6899062E+02 SIGNIFICANCE OF F = SIGNIFICANT σ = +4.2786890E+01
R = +2.8962173E-01 SIGNIFICANCE OF R = SIGNIFICANT Sa = +1.7746615E-02
t = +1.9209128E+01 SIGNIFICANCE OF t = SIGNIFICANT Se = +4.0958175E+01
N = 4032 DEGREES OF FREEDOM = 4030
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = +140 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI
80.00
160.00
240.00
320.00
400.00
480.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING G, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC, 140 DEG F, TPH-1011

Figure 48




WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 100 SEC, 140 DEG F, TPH-1011

Figure 49




WING G, STRESS RELAXATION MODULUS, 3.0% STRAIN, 1000 SEC, 140 DEG F, TPH-1011

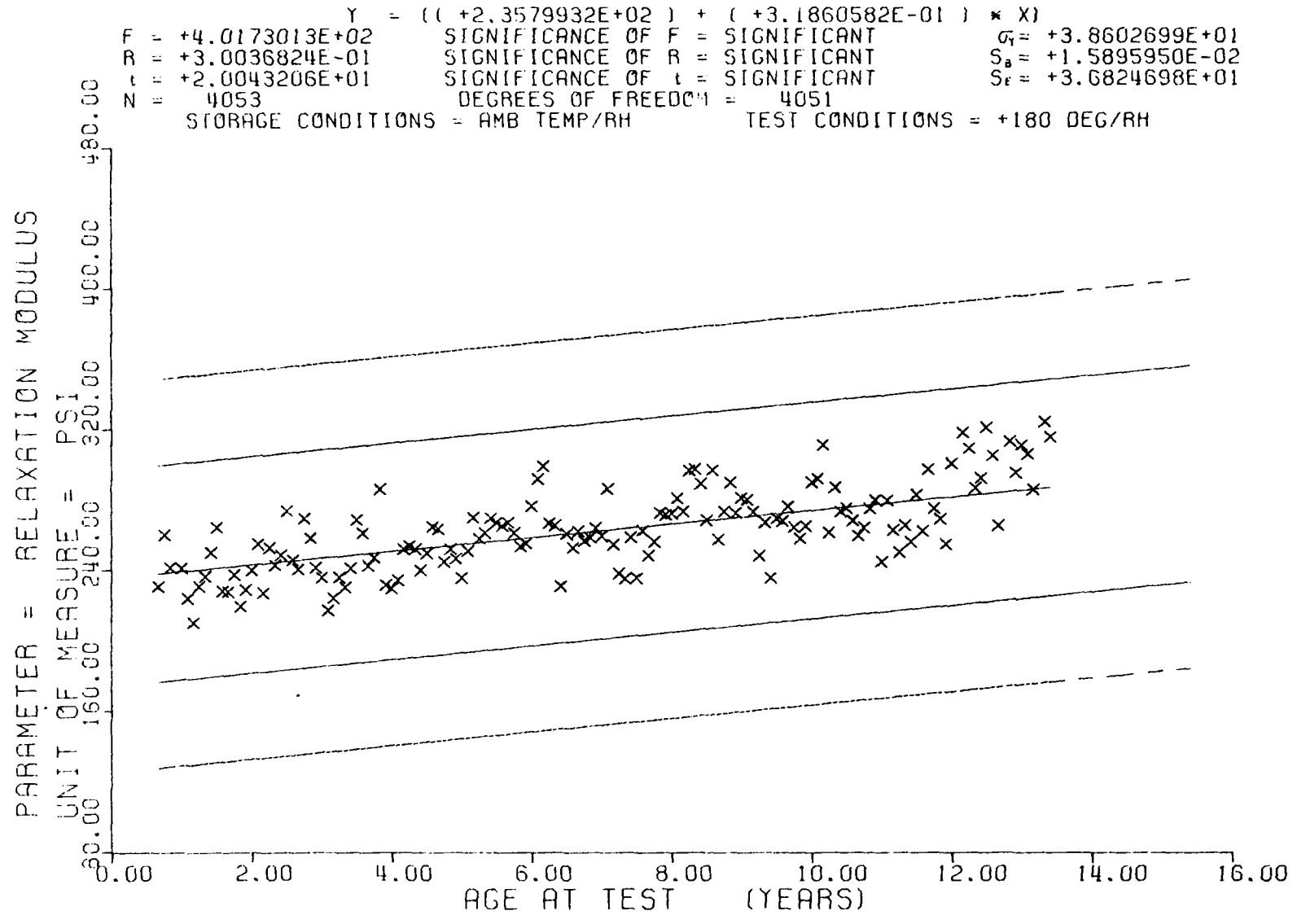
Figure 50

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 3 | 34 | 51 | 59 | 42 | 84 | 24 | 109 | 9 | 134 | 24 |
| 9 | 9 | 35 | 33 | 60 | 63 | 85 | 9 | 110 | 9 | 135 | 12 |
| 10 | 6 | 36 | 57 | 61 | 69 | 86 | 21 | 111 | 6 | 136 | 6 |
| 12 | 24 | 37 | 21 | 62 | 73 | 87 | 27 | 112 | 36 | 137 | 18 |
| 13 | 24 | 38 | 18 | 63 | 66 | 88 | 30 | 113 | 48 | 138 | 60 |
| 14 | 12 | 39 | 48 | 64 | 51 | 89 | 30 | 114 | 41 | 139 | 50 |
| 15 | 24 | 40 | 18 | 65 | 36 | 90 | 39 | 115 | 21 | 140 | 6 |
| 16 | 18 | 41 | 21 | 66 | 45 | 91 | 27 | 116 | 33 | 141 | 15 |
| 17 | 33 | 42 | 18 | 67 | 30 | 92 | 18 | 117 | 21 | 142 | 26 |
| 18 | 18 | 43 | 9 | 68 | 51 | 93 | 24 | 118 | 20 | 143 | 36 |
| 19 | 9 | 44 | 6 | 69 | 78 | 94 | 23 | 119 | 15 | 144 | 12 |
| 20 | 6 | 45 | 6 | 70 | 80 | 95 | 24 | 120 | 29 | 146 | 6 |
| 21 | 18 | 46 | 6 | 71 | 45 | 96 | 63 | 121 | 12 | 147 | 6 |
| 22 | 6 | 47 | 30 | 72 | 60 | 97 | 57 | 122 | 9 | 148 | 6 |
| 23 | 9 | 48 | 42 | 73 | 38 | 98 | 63 | 123 | 12 | 149 | 12 |
| 24 | 30 | 49 | 42 | 74 | 36 | 99 | 39 | 124 | 21 | 150 | 6 |
| 25 | 35 | 50 | 36 | 75 | 36 | 100 | 20 | 125 | 15 | 151 | 12 |
| 26 | 24 | 51 | 57 | 76 | 39 | 101 | 15 | 126 | 24 | 152 | 3 |
| 27 | 24 | 52 | 68 | 77 | 27 | 102 | 9 | 127 | 14 | 154 | 6 |
| 28 | 26 | 53 | 27 | 78 | 42 | 103 | 21 | 128 | 15 | 155 | 6 |
| 29 | 50 | 54 | 33 | 79 | 18 | 104 | 6 | 129 | 6 | 156 | 9 |
| 30 | 42 | 55 | 33 | 80 | 24 | 105 | 12 | 130 | 30 | 157 | 6 |
| 31 | 33 | 56 | 42 | 81 | 36 | 106 | 3 | 131 | 48 | 158 | 6 |
| 32 | 54 | 57 | 54 | 82 | 27 | 107 | 6 | 132 | 12 | 160 | 3 |
| 33 | 30 | 58 | 57 | 83 | 18 | 108 | 27 | 133 | 12 | 161 | 9 |

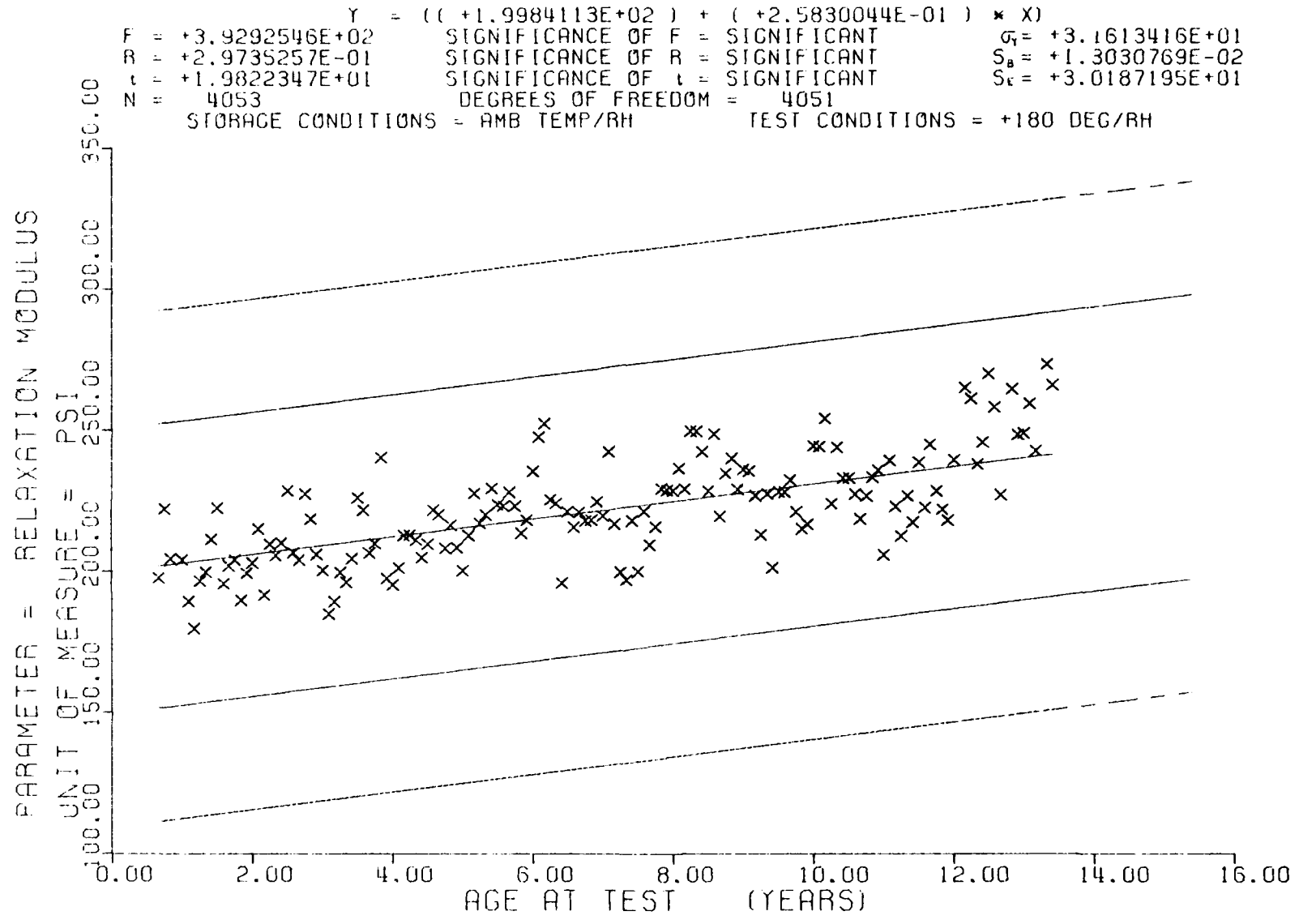
WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,1000 SEC,180 DEG F,TPH=1011

This sample size summary is applicable to figures 51 thru 54




WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 10 SEC, 180 DEG F, TPH-1011

Figure 51




WING 6, STRESS RELAXATION MODULUS, 3.0% STRAIN, 50 SEC, 180 DEG F, TPH-1011

Figure 52

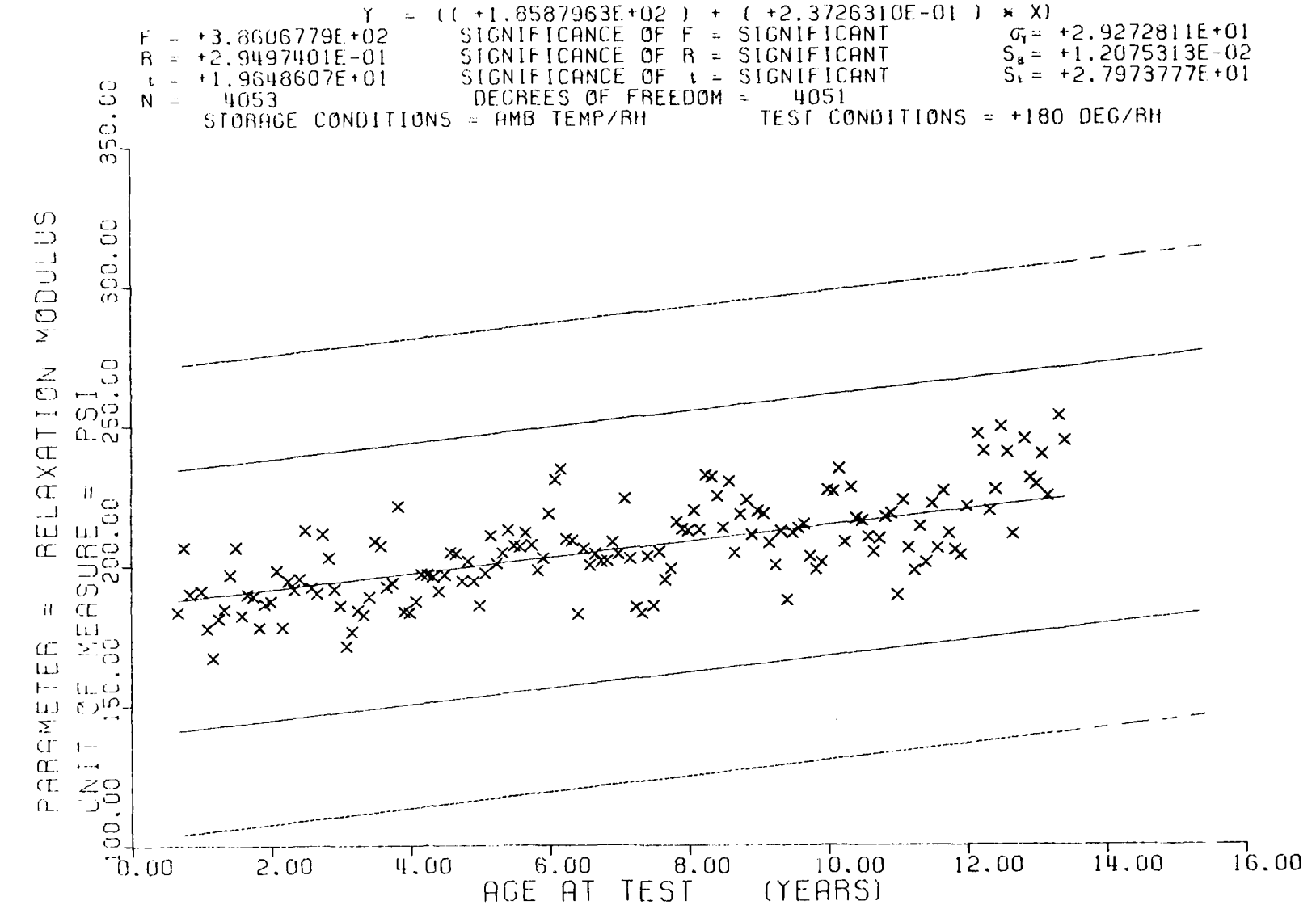
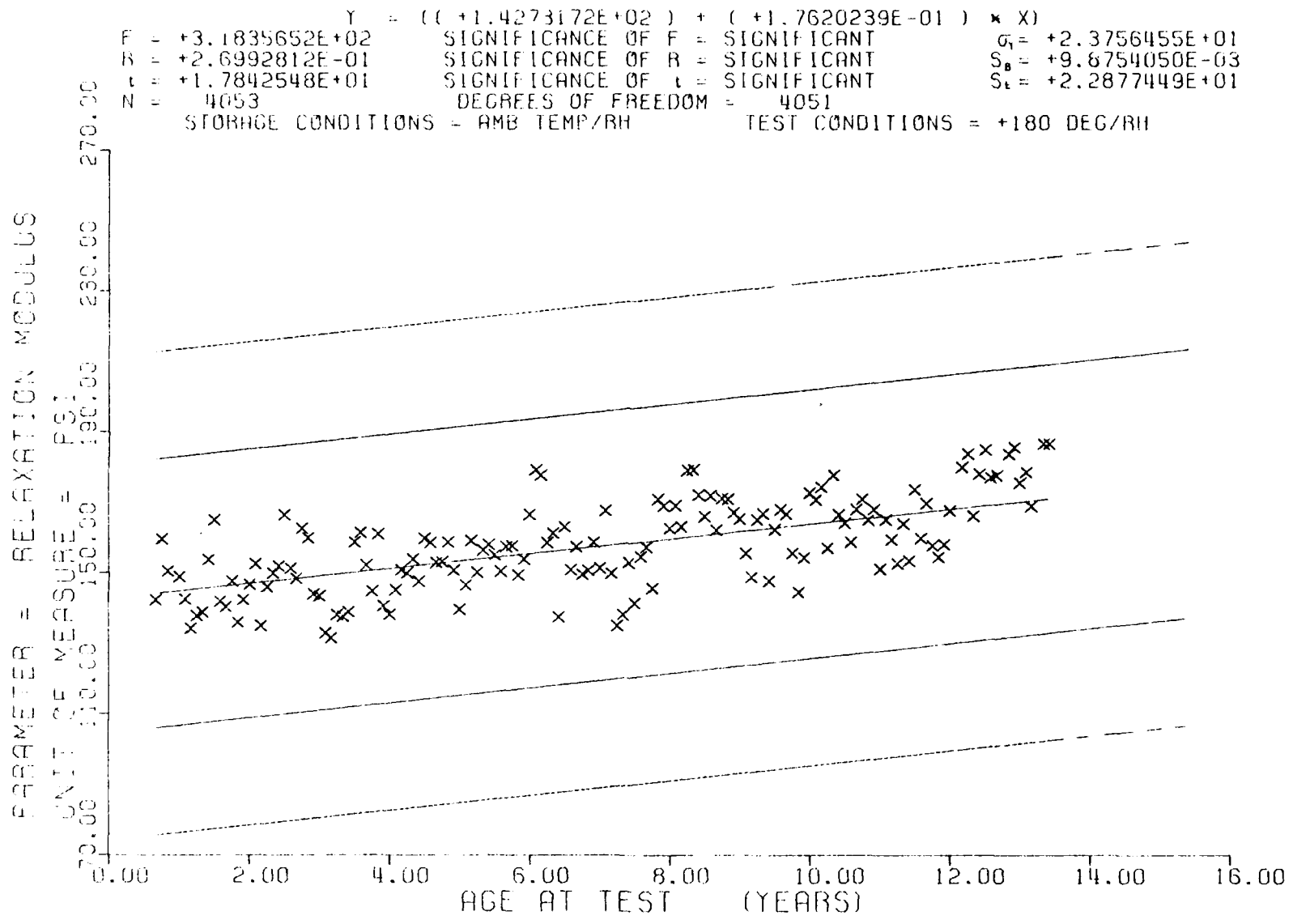

Y = (( +1.8587963E+02 ) + ( +2.3726310E-01 ) * X)
F = +3.8606779E+02
SIGNIFICANCE OF F = SIGNIFICANT
$\sigma_Y$ = +2.9272811E+01
R = +2.9497401E-01
SIGNIFICANCE OF R = SIGNIFICANT
$S_B$ = +1.2075313E-02
t = +1.9648607E+01
SIGNIFICANCE OF t = SIGNIFICANT
$S_t$ = +2.7973777E+01
N = 4053
DEGREES OF FREEDOM = 4051
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = +180 DEG/RH
PARAMETER = RELAXATION MODULUS
UNIT OF MEASURE = PSI
100.00
150.00
200.00
250.00
300.00
350.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
WING G,STRESS RELAXATION MODULUS,3.0% STRAIN,100 SEC,180 DEG F,TPH-101

Figure 53




WING 6,STRESS RELAXATION MODULUS,3.0% STRAIN,1000 SEC,180 DEG F,TPH-1011

Figure 54

*** SAMPLE SIZE SUMMARY ***

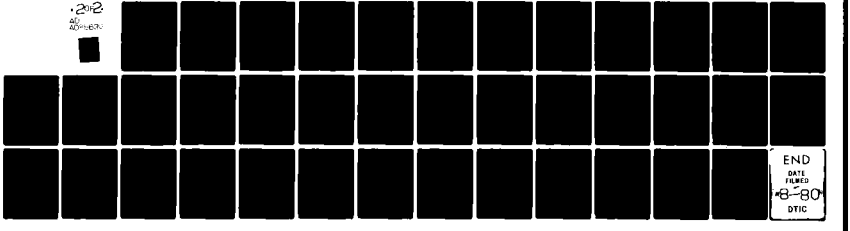
| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 34 | 48 | 59 | 44 | 84 | 16 | 110 | 24 | 136 | 32 |
| 3 | 4 | 35 | 64 | 60 | 73 | 85 | 13 | 111 | 60 | 137 | 19 |
| 10 | 24 | 36 | 47 | 61 | 64 | 86 | 16 | 112 | 20 | 138 | 34 |
| 12 | 12 | 37 | 56 | 62 | 74 | 87 | 16 | 113 | 20 | 139 | 122 |
| 13 | 12 | 38 | 47 | 63 | 74 | 88 | 28 | 114 | 76 | 140 | 34 |
| 14 | 36 | 39 | 36 | 64 | 80 | 89 | 44 | 115 | 76 | 141 | 4 |
| 15 | 20 | 40 | 45 | 65 | 90 | 90 | 44 | 116 | 71 | 142 | 4 |
| 16 | 20 | 41 | 36 | 66 | 39 | 91 | 48 | 117 | 32 | 143 | 12 |
| 17 | 28 | 42 | 26 | 67 | 52 | 92 | 32 | 118 | 120 | 144 | 15 |
| 18 | 12 | 43 | 20 | 68 | 64 | 93 | 23 | 119 | 98 | 145 | 4 |
| 19 | 52 | 44 | 4 | 69 | 67 | 94 | 32 | 120 | 104 | 147 | 4 |
| 20 | 12 | 45 | 12 | 70 | 56 | 95 | 39 | 121 | 76 | 148 | 12 |
| 21 | 32 | 46 | 19 | 71 | 84 | 96 | 36 | 122 | 60 | 149 | 4 |
| 22 | 28 | 47 | 36 | 72 | 100 | 97 | 44 | 123 | 8 | 150 | 12 |
| 23 | 24 | 48 | 36 | 73 | 69 | 98 | 36 | 124 | 12 | 151 | 11 |
| 24 | 8 | 49 | 44 | 74 | 107 | 99 | 80 | 126 | 7 | 152 | 12 |
| 25 | 40 | 50 | 24 | 75 | 64 | 100 | 80 | 127 | 28 | 154 | 4 |
| 26 | 56 | 51 | 60 | 76 | 40 | 101 | 56 | 128 | 20 | 155 | 4 |
| 27 | 32 | 52 | 100 | 77 | 44 | 102 | 32 | 129 | 48 | 156 | 12 |
| 28 | 44 | 53 | 112 | 78 | 54 | 103 | 36 | 130 | 24 | 158 | 4 |
| 29 | 48 | 54 | 38 | 79 | 38 | 104 | 12 | 131 | 74 | 159 | 7 |
| 30 | 44 | 55 | 42 | 80 | 50 | 105 | 4 | 132 | 128 | 160 | 4 |
| 31 | 16 | 56 | 70 | 81 | 40 | 106 | 28 | 133 | 79 | 163 | 4 |
| 32 | 64 | 57 | 43 | 82 | 20 | 107 | 16 | 134 | 52 | | |
| 33 | 20 | 58 | 86 | 83 | 40 | 108 | 12 | 135 | 48 | | |

STAGE 1, WING 6, TP-H1011, SOL GEL, DENSITY

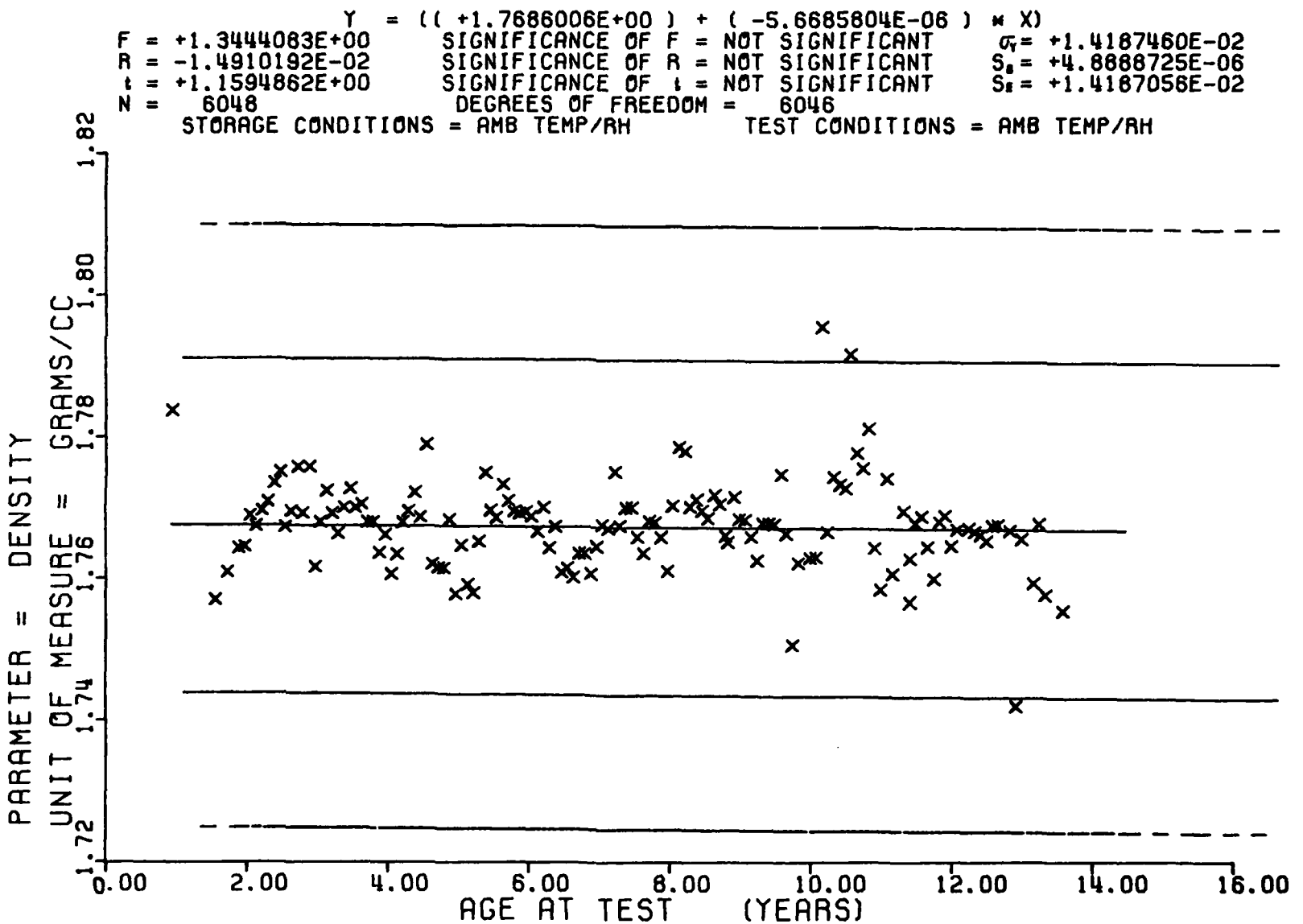
This sample size summary is applicable to figures 55 thru 57

AD-A085 630 OGDEN AIR LOGISTICS CENTER HILL AFB UT PROPELLANT LAB--ETC F/G 21/8.2
PROPELLANT SURVEILLANCE REPORT LGM-30 F & G STAGE I. PHASE G. S--ETC(U)
APR 80 J A THOMPSON

UNCLASSIFIED MANCP-438(80) NL

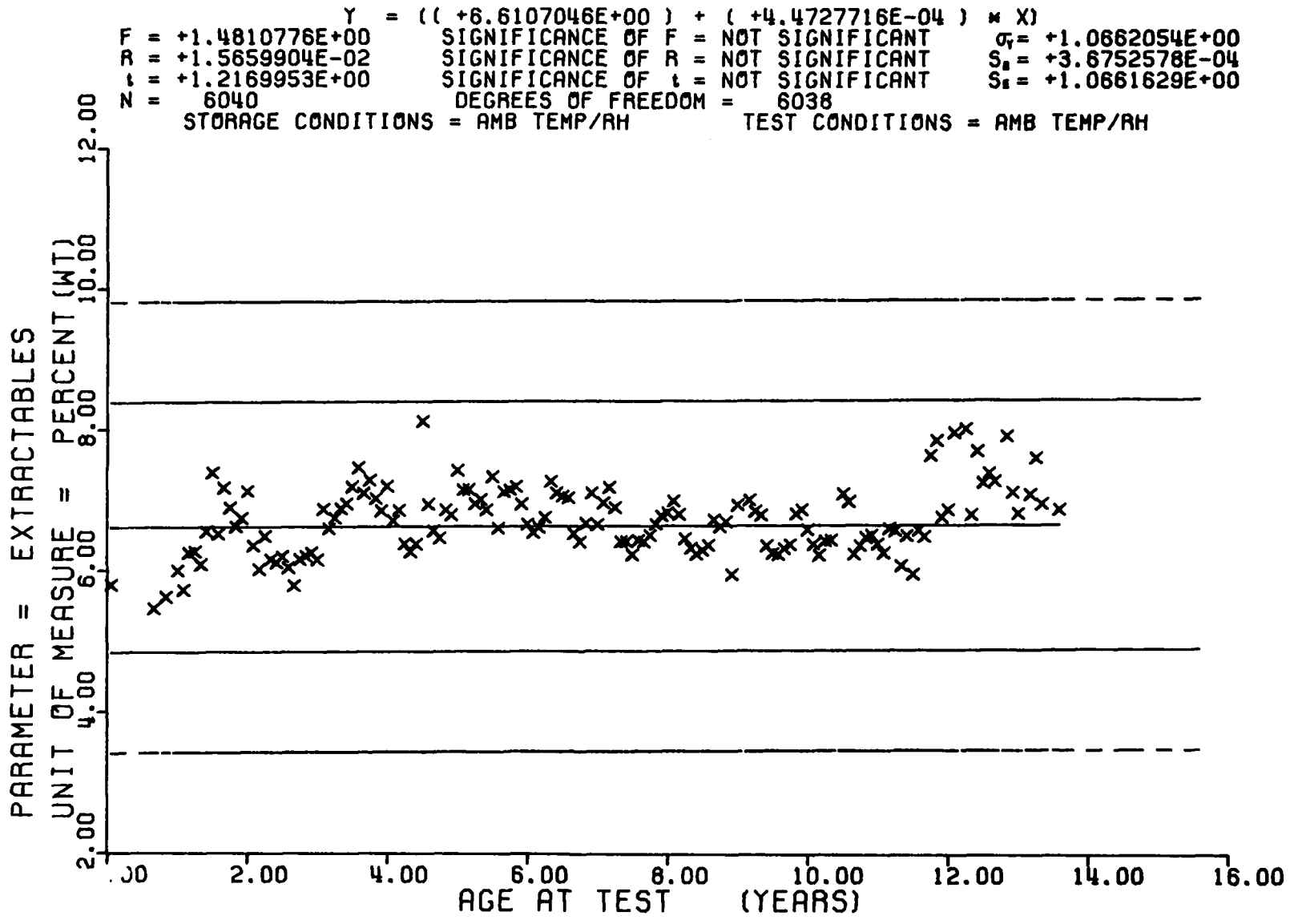


END
DATE FILMED
8-80
DTIC



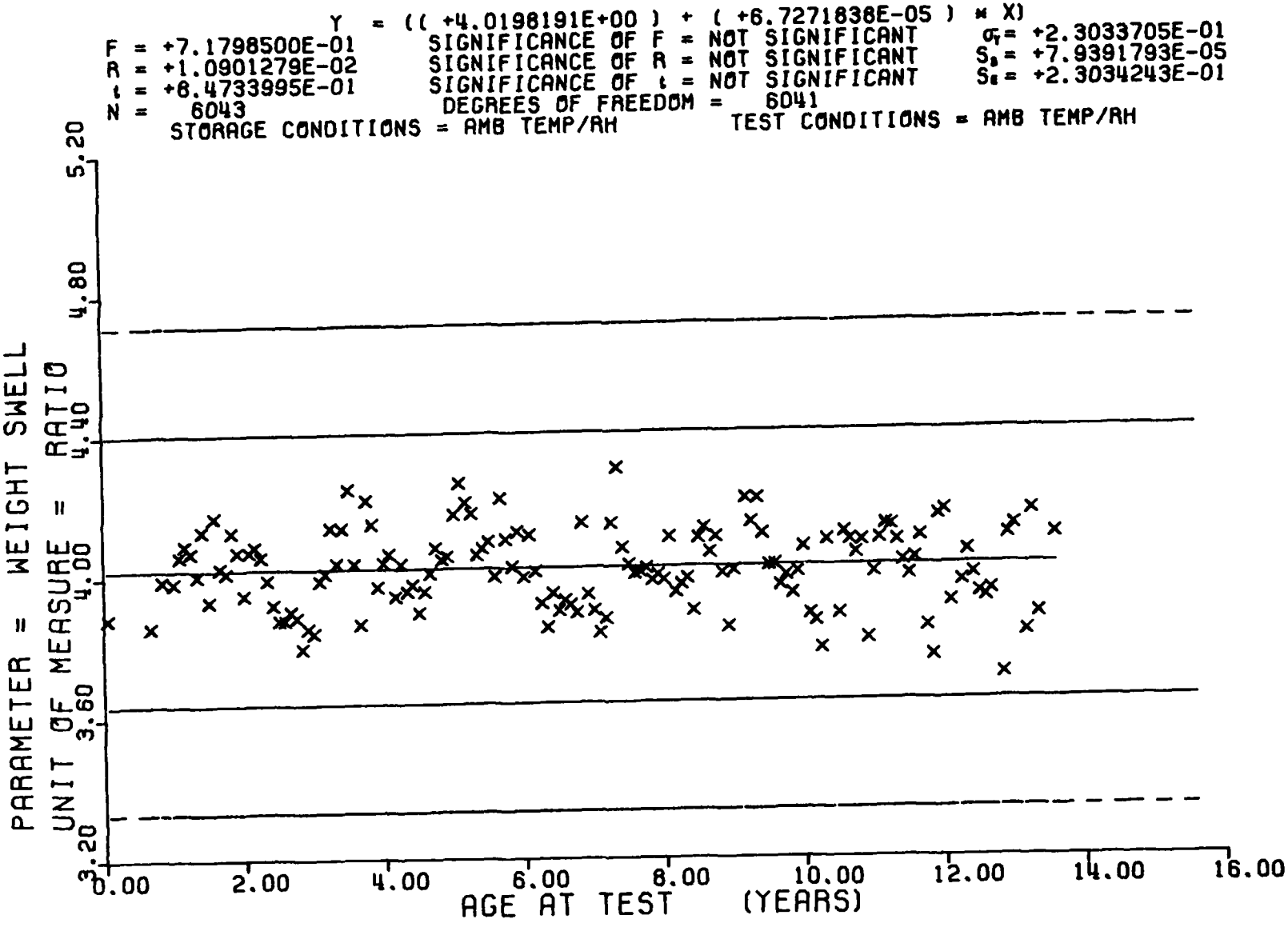

STAGE 1, WING 6, TP-H1011, SOL GEL, DENSITY

Figure 55




STAGE 1, WING 6 TP-H1011, SOL GEL, PERCENT EXTRACTABLES

Figure 56




STAGE 1, WING 6, TP-H1011, SOL GEL, GEL SWELL RATIO

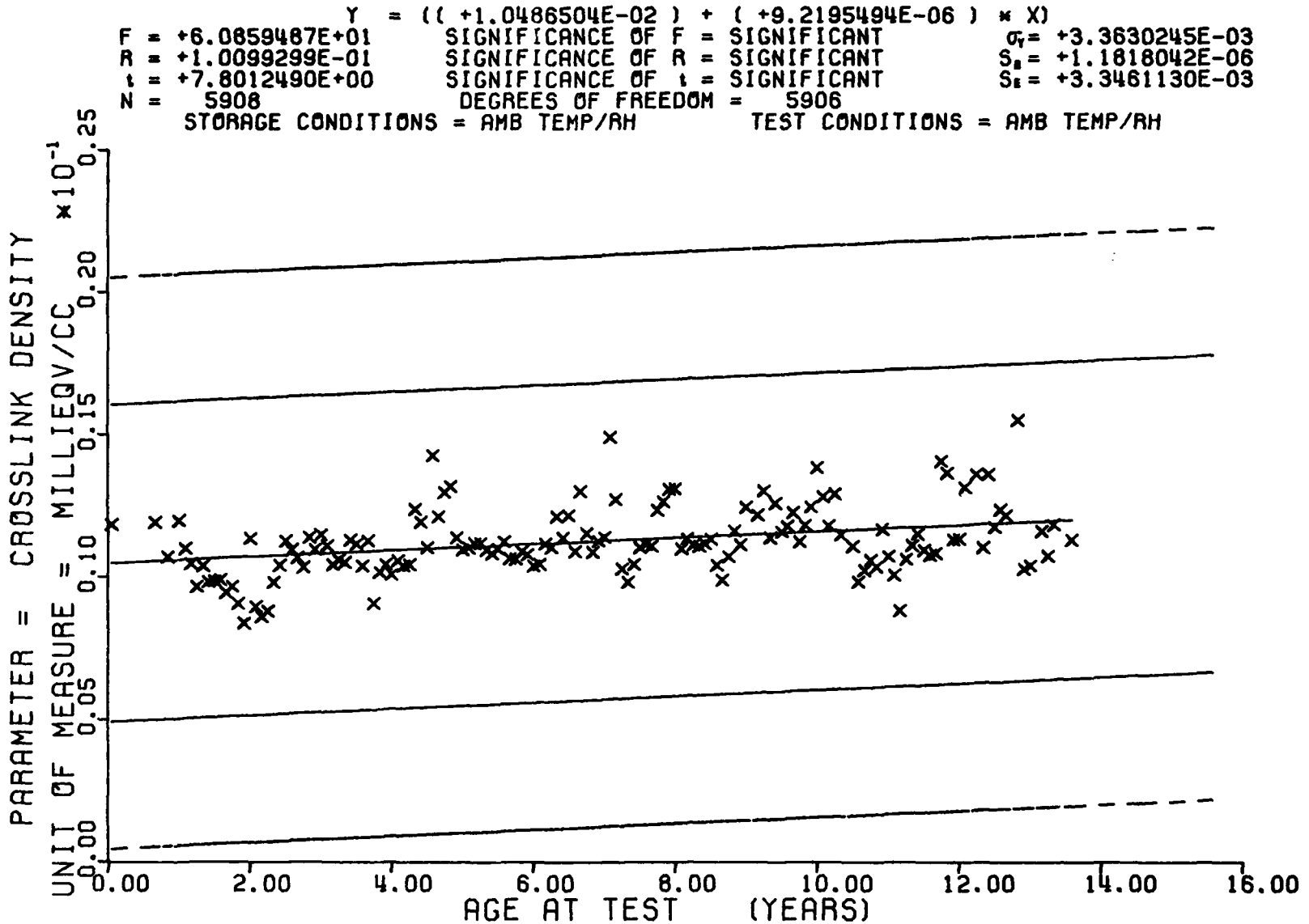
Figure 57

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 34 | 48 | 59 | 44 | 84 | 16 | 110 | 24 | 136 | 24 |
| 9 | 4 | 35 | 64 | 60 | 73 | 85 | 13 | 111 | 60 | 137 | 15 |
| 10 | 24 | 36 | 47 | 61 | 64 | 86 | 16 | 112 | 20 | 138 | 30 |
| 12 | 12 | 37 | 56 | 62 | 74 | 87 | 16 | 113 | 20 | 139 | 62 |
| 13 | 32 | 38 | 47 | 63 | 74 | 88 | 28 | 114 | 76 | 140 | 29 |
| 14 | 36 | 39 | 36 | 64 | 79 | 89 | 44 | 115 | 76 | 141 | 4 |
| 15 | 20 | 40 | 45 | 65 | 90 | 90 | 44 | 116 | 71 | 142 | 4 |
| 16 | 20 | 41 | 36 | 66 | 39 | 91 | 48 | 117 | 32 | 143 | 12 |
| 17 | 28 | 42 | 26 | 67 | 52 | 92 | 32 | 118 | 120 | 144 | 15 |
| 18 | 32 | 43 | 20 | 68 | 64 | 93 | 23 | 119 | 98 | 145 | 4 |
| 19 | 52 | 44 | 4 | 69 | 67 | 94 | 32 | 120 | 104 | 147 | 4 |
| 20 | 12 | 45 | 12 | 70 | 56 | 95 | 39 | 121 | 76 | 148 | 12 |
| 21 | 32 | 46 | 19 | 71 | 84 | 96 | 36 | 122 | 60 | 149 | 4 |
| 22 | 28 | 47 | 36 | 72 | 100 | 97 | 43 | 123 | 8 | 150 | 12 |
| 23 | 24 | 48 | 36 | 73 | 60 | 98 | 36 | 124 | 12 | 151 | 11 |
| 24 | 8 | 49 | 44 | 74 | 107 | 99 | 80 | 126 | 7 | 152 | 12 |
| 25 | 40 | 50 | 24 | 75 | 64 | 100 | 80 | 127 | 28 | 154 | 4 |
| 26 | 56 | 51 | 60 | 76 | 40 | 101 | 56 | 128 | 20 | 155 | 4 |
| 27 | 32 | 52 | 103 | 77 | 44 | 102 | 32 | 129 | 48 | 156 | 12 |
| 28 | 44 | 53 | 112 | 78 | 54 | 103 | 36 | 130 | 24 | 158 | 4 |
| 29 | 43 | 54 | 14 | 79 | 38 | 104 | 12 | 131 | 74 | 159 | 7 |
| 30 | 44 | 55 | 42 | 80 | 50 | 105 | 4 | 132 | 128 | 160 | 4 |
| 31 | 72 | 56 | 70 | 81 | 40 | 106 | 28 | 133 | 79 | 163 | 4 |
| 32 | 64 | 57 | 43 | 82 | 20 | 107 | 16 | 134 | 40 | | |
| 33 | 52 | 58 | 86 | 83 | 39 | 108 | 12 | 135 | 28 | | |

STAGE 1, WING 6, TP-H1011, SOL GEL, CROSSLINK DENSITY

This sample size summary is applicable to figure 58




STAGE 1, WING 6, TP-H1011, SOL GEL, CROSSLINK DENSITY

Figure 58

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 3 | 27 | 29 | 53 | 72 | 78 | 75 | 103 | 12 | 129 | 9 |
| 3 | 15 | 28 | 34 | 54 | 42 | 79 | 29 | 104 | 12 | 130 | 60 |
| 4 | 10 | 29 | 59 | 55 | 34 | 80 | 54 | 105 | 3 | 131 | 96 |
| 5 | 11 | 30 | 31 | 56 | 74 | 81 | 51 | 106 | 3 | 132 | 18 |
| 6 | 23 | 31 | 51 | 57 | 84 | 82 | 32 | 107 | 15 | 133 | 21 |
| 7 | 18 | 32 | 67 | 58 | 60 | 83 | 38 | 108 | 6 | 134 | 36 |
| 8 | 24 | 33 | 56 | 59 | 40 | 84 | 25 | 109 | 36 | 135 | 18 |
| 9 | 24 | 34 | 61 | 60 | 53 | 85 | 33 | 110 | 33 | 136 | 12 |
| 10 | 40 | 35 | 39 | 61 | 72 | 86 | 27 | 111 | 18 | 137 | 27 |
| 11 | 24 | 36 | 32 | 62 | 99 | 87 | 39 | 112 | 22 | 138 | 87 |
| 12 | 40 | 37 | 43 | 63 | 94 | 88 | 32 | 113 | 107 | 139 | 60 |
| 13 | 51 | 38 | 29 | 64 | 92 | 89 | 55 | 114 | 47 | 140 | 23 |
| 14 | 52 | 39 | 48 | 65 | 37 | 90 | 57 | 115 | 57 | 141 | 15 |
| 15 | 52 | 40 | 36 | 66 | 37 | 91 | 39 | 116 | 45 | 142 | 24 |
| 16 | 63 | 41 | 12 | 67 | 62 | 92 | 32 | 117 | 107 | 143 | 66 |
| 17 | 15 | 42 | 24 | 68 | 82 | 93 | 19 | 118 | 37 | 144 | 3 |
| 18 | 65 | 43 | 24 | 69 | 65 | 94 | 37 | 119 | 63 | 145 | 9 |
| 19 | 38 | 44 | 16 | 70 | 83 | 95 | 42 | 120 | 81 | 146 | 15 |
| 20 | 28 | 46 | 31 | 71 | 40 | 96 | 50 | 121 | 48 | 147 | 3 |
| 21 | 17 | 47 | 30 | 72 | 27 | 97 | 95 | 122 | 12 | 148 | 6 |
| 22 | 22 | 48 | 37 | 73 | 78 | 98 | 70 | 123 | 3 | 149 | 14 |
| 23 | 11 | 49 | 64 | 74 | 60 | 99 | 44 | 124 | 3 | 150 | 3 |
| 24 | 19 | 50 | 17 | 75 | 63 | 100 | 39 | 125 | 9 | 151 | 6 |
| 25 | 64 | 51 | 60 | 76 | 55 | 101 | 24 | 126 | 3 | 153 | 3 |
| 26 | 22 | 52 | 50 | 77 | 43 | 102 | 14 | 128 | 12 | 154 | 6 |
| | | | | | | | | | | 155 | 3 |
| | | | | | | | | | | 156 | 3 |
| | | | | | | | | | | 157 | 6 |
| | | STAGE 1 | | WING 6 | | TP-H 1011 | | CONSTANT STRAIN | | 159 | 6 |
| | | | | | | | | | | 161 | 3 |
| | | This sample size summary is applicable to figure 59 | | | | | | | | 166 | 3 |

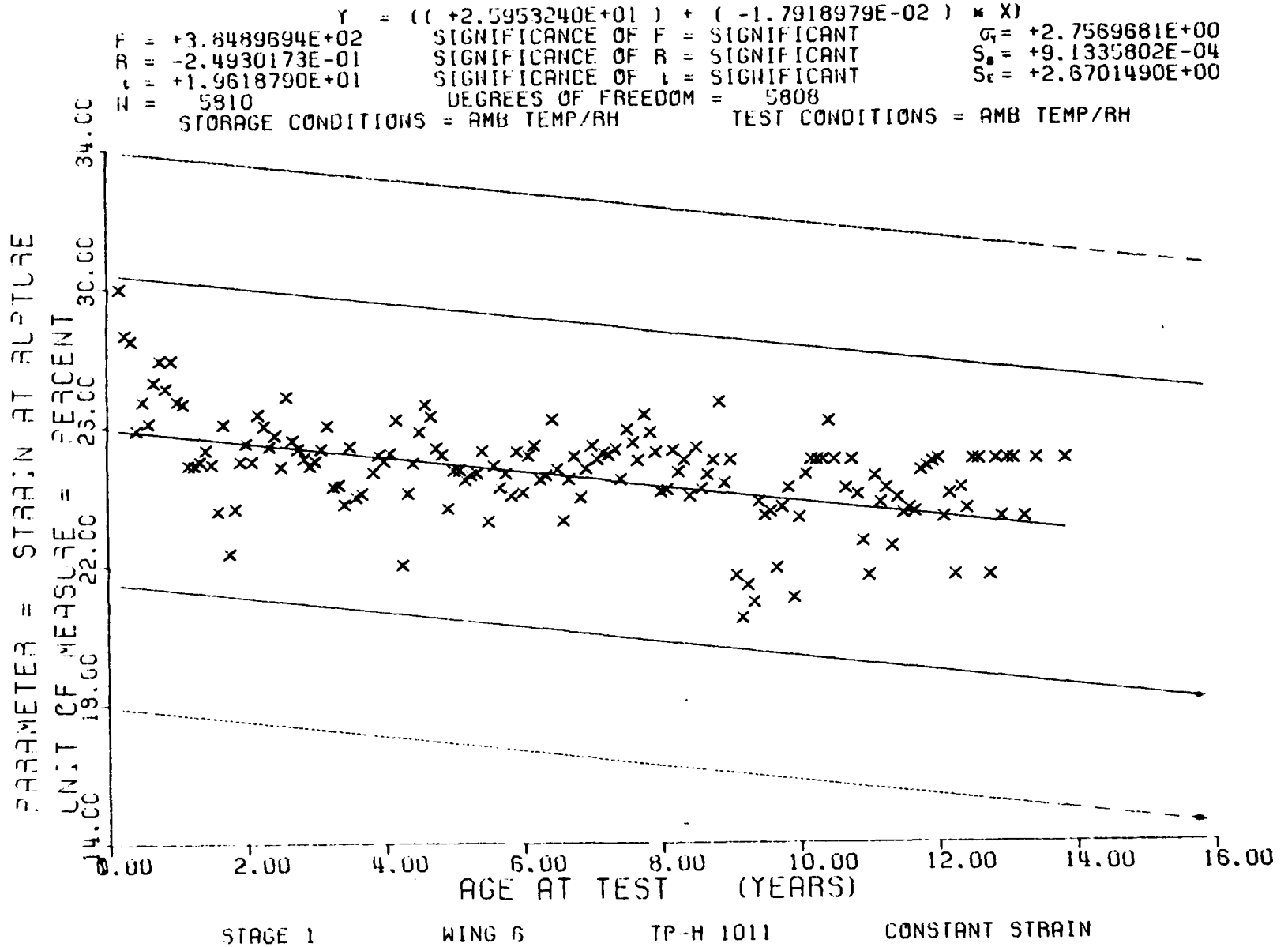

Y = (( +2.5953240E+01 ) + ( -1.7918979E-02 ) * X)
F = +3.8489694E+02
R = -2.4930173E-01
t = +1.9618790E+01
N = 5810
SIGNIFICANCE OF F = SIGNIFICANT
SIGNIFICANCE OF R = SIGNIFICANT
SIGNIFICANCE OF t = SIGNIFICANT
DEGREES OF FREEDOM = 5808
σ = +2.7569681E+00
Sb = +9.1335802E-04
St = +2.6701490E+00
STORAGE CONDITIONS = AMB TEMP/RH
TEST CONDITIONS = AMB TEMP/RH
PARAMETER = STRAIN AT ALPTLRE
UNIT OF MEASURE = PERCENT
34.00
30.00
26.00
22.00
18.00
14.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STAGE 1
WING 6
TP-H 1011
CONSTANT STRAIN

Figure 59

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 32 | 30 | 58 | 54 | 83 | 12 | 109 | 6 | 134 | 21 |
| 6 | 3 | 33 | 24 | 59 | 33 | 84 | 12 | 110 | 21 | 135 | 21 |
| 7 | 3 | 34 | 27 | 60 | 51 | 85 | 27 | 111 | 15 | 136 | 33 |
| 8 | 3 | 35 | 27 | 61 | 57 | 86 | 9 | 112 | 21 | 137 | 18 |
| 9 | 12 | 36 | 45 | 62 | 57 | 87 | 24 | 113 | 51 | 138 | 64 |
| 10 | 6 | 37 | 18 | 63 | 81 | 88 | 36 | 114 | 21 | 139 | 45 |
| 12 | 18 | 38 | 21 | 64 | 42 | 89 | 36 | 115 | 9 | 140 | 27 |
| 13 | 15 | 39 | 45 | 65 | 9 | 90 | 51 | 116 | 39 | 141 | 18 |
| 14 | 6 | 40 | 15 | 66 | 36 | 91 | 24 | 117 | 36 | 142 | 9 |
| 15 | 30 | 41 | 21 | 67 | 42 | 92 | 33 | 118 | 9 | 144 | 21 |
| 16 | 19 | 42 | 6 | 68 | 60 | 93 | 18 | 119 | 12 | 145 | 3 |
| 17 | 15 | 43 | 6 | 69 | 86 | 94 | 27 | 120 | 30 | 146 | 12 |
| 18 | 15 | 44 | 9 | 70 | 105 | 95 | 27 | 121 | 6 | 147 | 3 |
| 19 | 6 | 46 | 12 | 71 | 36 | 96 | 15 | 122 | 6 | 148 | 3 |
| 20 | 2 | 47 | 9 | 72 | 39 | 97 | 72 | 123 | 21 | 149 | 9 |
| 21 | 15 | 48 | 51 | 73 | 42 | 98 | 60 | 124 | 18 | 150 | 12 |
| 22 | 3 | 49 | 45 | 74 | 30 | 99 | 51 | 125 | 27 | 151 | 3 |
| 24 | 27 | 50 | 51 | 75 | 33 | 100 | 51 | 126 | 21 | 152 | 3 |
| 25 | 21 | 51 | 57 | 76 | 30 | 101 | 9 | 127 | 33 | 154 | 6 |
| 26 | 39 | 52 | 72 | 77 | 27 | 102 | 15 | 128 | 36 | 155 | 3 |
| 27 | 12 | 53 | 27 | 78 | 27 | 103 | 12 | 129 | 27 | 156 | 9 |
| 28 | 21 | 54 | 24 | 79 | 21 | 104 | 18 | 130 | 42 | 157 | 6 |
| 29 | 24 | 55 | 39 | 80 | 15 | 106 | 3 | 131 | 41 | 158 | 3 |
| 30 | 21 | 56 | 60 | 81 | 41 | 107 | 18 | 132 | 21 | 159 | 3 |
| 31 | 39 | 57 | 69 | 82 | 18 | 108 | 3 | 133 | 24 | 160 | 6 |
| | | | | | | | | | | 161 | 3 |
| | | | | | | | | | | 168 | 3 |

STAGE 1 WING 6 TP-H 1011 SHORE A, 10 SECOND HARDNESS

This sample size summary is applicable to figure 60

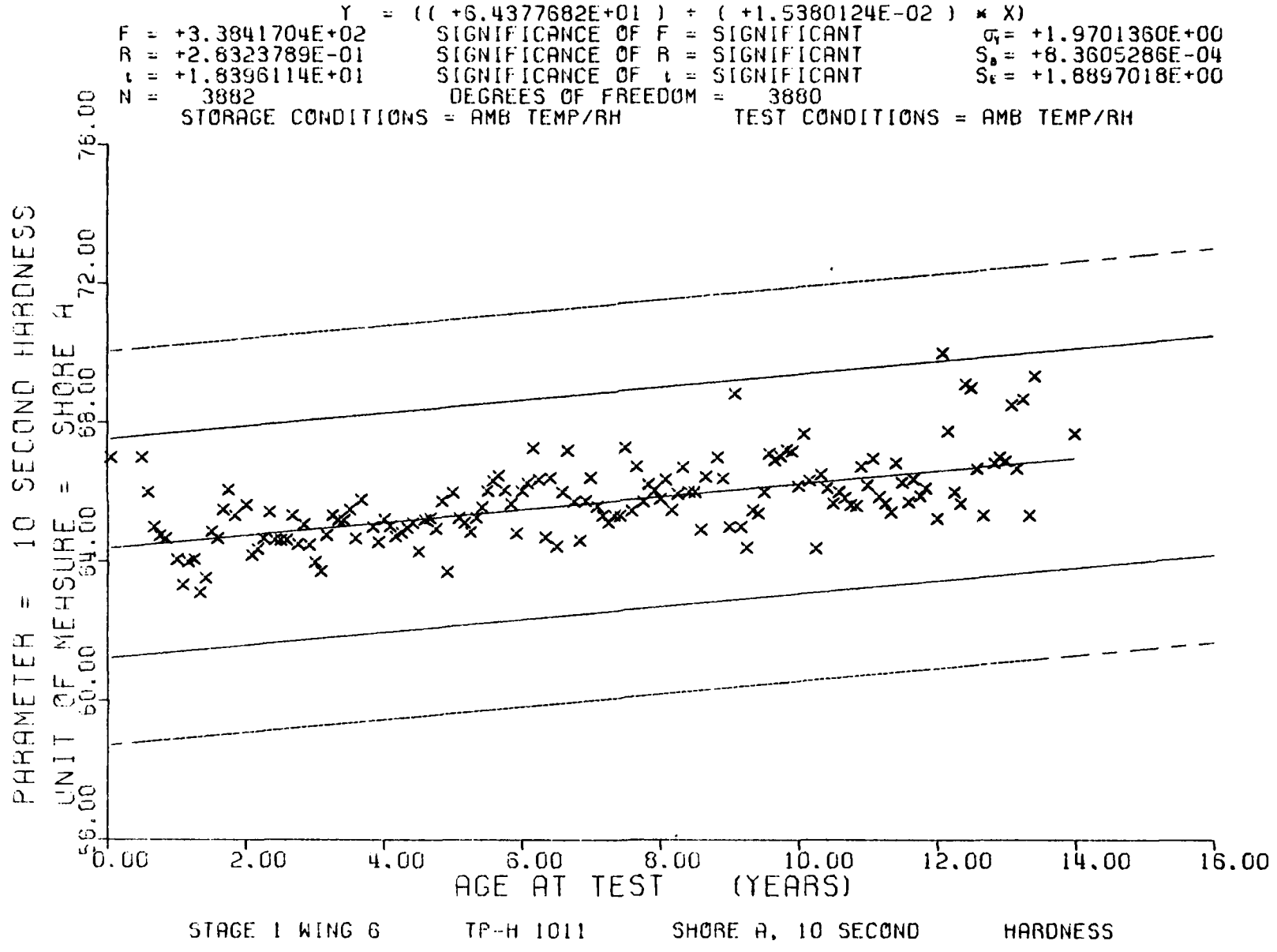

Y = (( +6.4377682E+01 ) + ( +1.5380124E-02 ) * X)
F = +3.3841704E+02 SIGNIFICANCE OF F = SIGNIFICANT σY = +1.9701360E+00
R = +2.8323789E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +8.3605286E-04
t = +1.8396114E+01 SIGNIFICANCE OF t = SIGNIFICANT Se = +1.8897018E+00
N = 3882 DEGREES OF FREEDOM = 3880
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = 10 SECOND HARDNESS
UNIT OF MEASURE = SHORE A
56.00
60.00
64.00
68.00
72.00
76.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STAGE 1 WING 6 TP-H 1011 SHORE A, 10 SECOND HARDNESS

Figure 60

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|
| 9 | 3 | 34 | 39 | 59 | 57 | 84 | 9 | 115 | 56 |
| 10 | 15 | 35 | 50 | 60 | 43 | 85 | 3 | 116 | 55 |
| 11 | 1 | 36 | 39 | 61 | 34 | 86 | 3 | 117 | 7 |
| 12 | 6 | 37 | 13 | 62 | 79 | 87 | 3 | 118 | 10 |
| 13 | 15 | 38 | 11 | 63 | 46 | 88 | 12 | 120 | 39 |
| 14 | 13 | 39 | 10 | 64 | 80 | 89 | 24 | 121 | 12 |
| 15 | 16 | 40 | 11 | 65 | 72 | 90 | 36 | 129 | 3 |
| 16 | 17 | 41 | 13 | 66 | 38 | 91 | 24 | 130 | 36 |
| 17 | 18 | 42 | 30 | 67 | 59 | 92 | 9 | 131 | 33 |
| 18 | 19 | 43 | 4 | 68 | 38 | 93 | 17 | 132 | 5 |
| 19 | 22 | 44 | 10 | 69 | 40 | 94 | 15 | 133 | 6 |
| 20 | 35 | 45 | 7 | 70 | 46 | 95 | 19 | 134 | 18 |
| 21 | 16 | 46 | 12 | 71 | 11 | 96 | 18 | 135 | 25 |
| 22 | 19 | 47 | 16 | 72 | 12 | 97 | 38 | 136 | 3 |
| 23 | 21 | 48 | 4 | 73 | 8 | 98 | 40 | 139 | 12 |
| 24 | 19 | 49 | 36 | 74 | 4 | 99 | 26 | 140 | 12 |
| 25 | 25 | 50 | 13 | 75 | 36 | 100 | 23 | | |
| 26 | 27 | 51 | 38 | 76 | 26 | 101 | 21 | | |
| 27 | 36 | 52 | 39 | 77 | 22 | 102 | 8 | | |
| 28 | 38 | 53 | 47 | 78 | 13 | 103 | 6 | | |
| 29 | 43 | 54 | 37 | 79 | 7 | 105 | 9 | | |
| 30 | 24 | 55 | 25 | 80 | 21 | 106 | 6 | | |
| 31 | 51 | 56 | 21 | 81 | 24 | 108 | 3 | | |
| 32 | 42 | 57 | 25 | 82 | 7 | 113 | 3 | | |
| 33 | 54 | 58 | 22 | 83 | 9 | 114 | 11 | | |

STAGE 1 WING 6 TP-H 1011 TIME TO MAXIMUM PRESSURE PRESSURE TIME

This sample size summary is applicable to figures 61 and 62

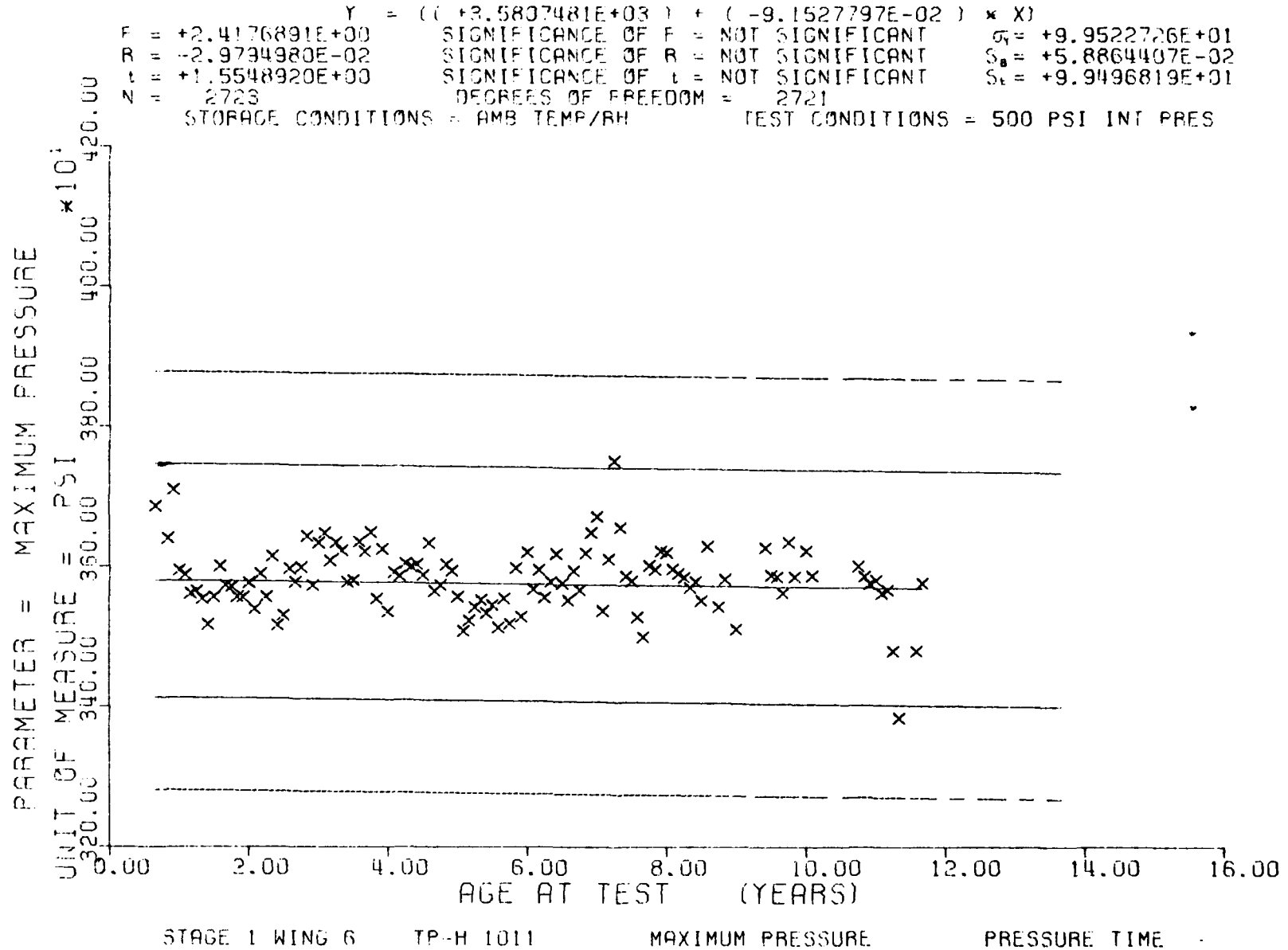

Y = ( +3.5807481E+03 ) + ( -9.1527797E-02 ) * X)
F = +2.4176891E+00 SIGNIFICANCE OF F = NOT SIGNIFICANT
R = -2.9794980E-02 SIGNIFICANCE OF R = NOT SIGNIFICANT
t = +1.5548920E+00 SIGNIFICANCE OF t = NOT SIGNIFICANT
N = 2723 DEGREES OF FREEDOM = 2721
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 500 PSI INT PRES
PARAMETER = MAXIMUM PRESSURE
UNIT OF MEASURE = PSI *10³
320.00
340.00
360.00
380.00
400.00
420.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STAGE 1 WING 6 TP-H 1011 MAXIMUM PRESSURE PRESSURE TIME

Figure 61

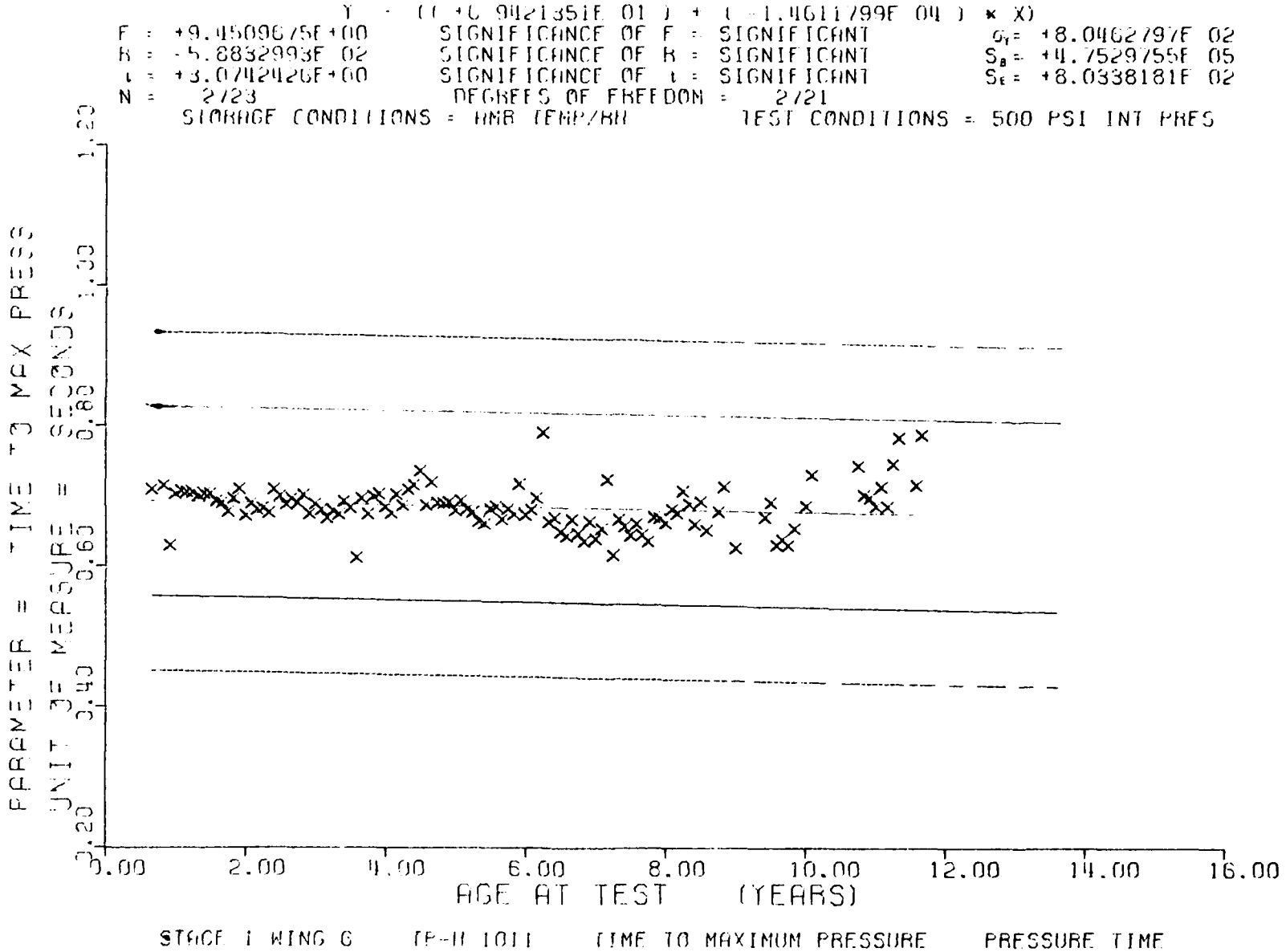

Y = ( +6.9421351E 01 ) + ( -1.4611799E 04 ) * X)
F = +9.4509975E+00 SIGNIFICANCE OF F = SIGNIFICANT
R = -5.8832993E 02 SIGNIFICANCE OF R = SIGNIFICANT
t = +3.0742426E+00 SIGNIFICANCE OF t = SIGNIFICANT
N = 2723 DEGREES OF FREEDOM = 2721
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 500 PSI INT PRES
PARAMETER = TIME TO MAX PRESS
UNIT OF MEASURE = SECONDS
3.20
3.40
0.60
0.80
1.00
1.20
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STAGE I WING G TF-H 1011 TIME TO MAXIMUM PRESSURE PRESSURE TIME

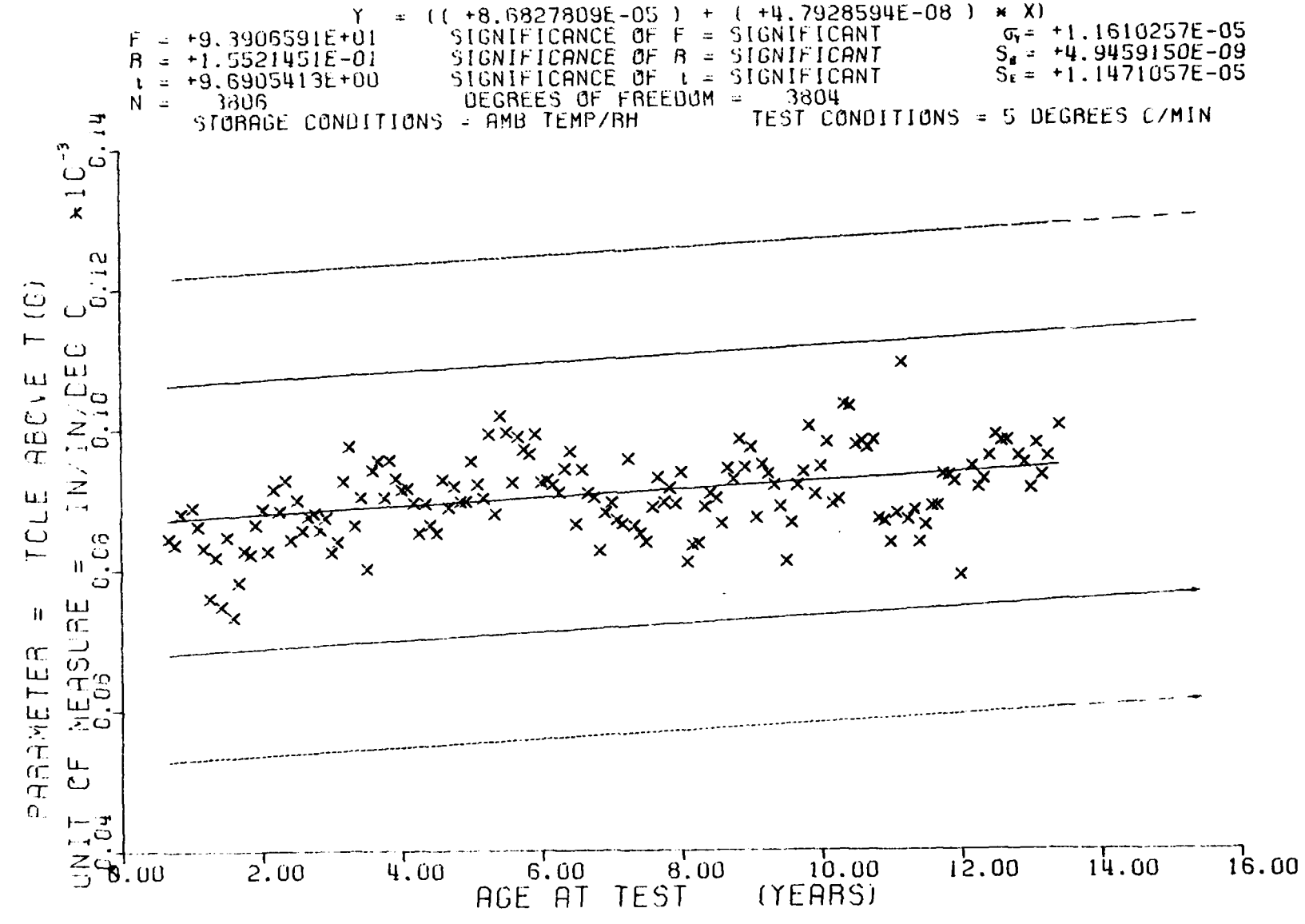
Figure 62

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 3 | 34 | 48 | 59 | 33 | 84 | 17 | 109 | 8 | 134 | 33 |
| 9 | 19 | 35 | 39 | 60 | 42 | 85 | 19 | 110 | 22 | 135 | 12 |
| 10 | 7 | 36 | 30 | 61 | 44 | 86 | 11 | 111 | 7 | 136 | 13 |
| 12 | 22 | 37 | 53 | 62 | 33 | 87 | 12 | 112 | 7 | 137 | 11 |
| 13 | 29 | 38 | 18 | 63 | 34 | 88 | 9 | 113 | 18 | 138 | 62 |
| 14 | 15 | 39 | 32 | 64 | 33 | 89 | 22 | 114 | 22 | 139 | 45 |
| 15 | 21 | 40 | 27 | 65 | 50 | 90 | 17 | 115 | 22 | 140 | 12 |
| 16 | 24 | 41 | 21 | 66 | 32 | 91 | 17 | 116 | 17 | 141 | 6 |
| 17 | 9 | 42 | 15 | 67 | 31 | 92 | 7 | 117 | 110 | 142 | 24 |
| 18 | 33 | 43 | 12 | 68 | 49 | 93 | 27 | 118 | 65 | 143 | 47 |
| 19 | 4 | 44 | 19 | 69 | 97 | 94 | 27 | 119 | 15 | 144 | 2 |
| 20 | 8 | 45 | 9 | 70 | 61 | 95 | 39 | 120 | 17 | 146 | 6 |
| 21 | 25 | 46 | 3 | 71 | 29 | 96 | 22 | 121 | 11 | 147 | 4 |
| 22 | 24 | 47 | 56 | 72 | 19 | 97 | 34 | 122 | 28 | 148 | 2 |
| 23 | 12 | 48 | 32 | 73 | 26 | 98 | 72 | 123 | 6 | 149 | 8 |
| 24 | 18 | 49 | 42 | 74 | 5 | 99 | 38 | 124 | 23 | 150 | 8 |
| 25 | 42 | 50 | 25 | 75 | 26 | 100 | 23 | 125 | 31 | 151 | 2 |
| 26 | 15 | 51 | 64 | 76 | 25 | 101 | 8 | 126 | 9 | 152 | 2 |
| 27 | 27 | 52 | 66 | 77 | 20 | 102 | 14 | 127 | 29 | 154 | 2 |
| 28 | 24 | 53 | 80 | 78 | 37 | 103 | 11 | 128 | 26 | 155 | 4 |
| 29 | 39 | 54 | 15 | 79 | 16 | 104 | 9 | 129 | 10 | 156 | 2 |
| 30 | 42 | 55 | 39 | 80 | 32 | 105 | 9 | 130 | 41 | 157 | 2 |
| 31 | 48 | 56 | 51 | 81 | 55 | 106 | 11 | 131 | 54 | 158 | 2 |
| 32 | 54 | 57 | 45 | 82 | 16 | 107 | 8 | 132 | 20 | 159 | 2 |
| 33 | 39 | 58 | 66 | 83 | 22 | 108 | 8 | 133 | 14 | 161 | 2 |

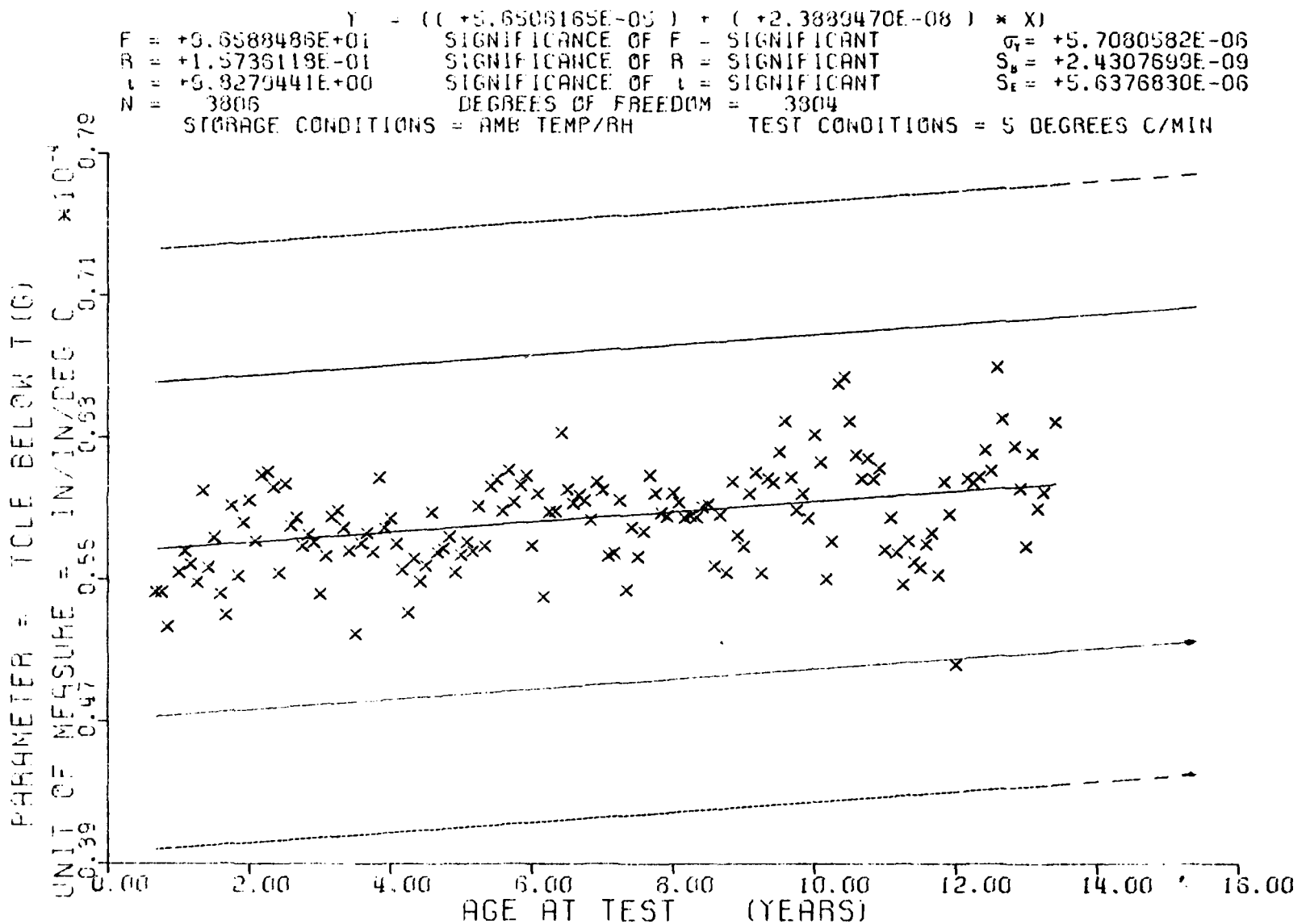
STAGE 1, WING 6, TE-H1011, THERMAL COEFFICIENT OF LINEAR EXPANSION ABOVE TG

This sample size summary is applicable to figures 63 and 64




STAGE 1, WING 6, TP-H1011, THERMAL COEFFICIENT OF LINEAR EXPANSION ABOVE TG

Figure 63




STAGE 1, WING 6, TP-H1011 THERMAL COEFFICIENT OF LINEAR EXPANSION BELOW TG

Figure 64

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 37 | 13 | 65 | 14 | 95 | 7 | 125 | 2 | 157 | 2 |
| 10 | 1 | 38 | 4 | 66 | 23 | 96 | 4 | 126 | 2 | 158 | 4 |
| 11 | 1 | 39 | 7 | 67 | 34 | 97 | 6 | 127 | 2 | 161 | 2 |
| 13 | 1 | 40 | 5 | 68 | 20 | 98 | 4 | 130 | 4 | 162 | 1 |
| 15 | 1 | 41 | 17 | 69 | 16 | 99 | 5 | 131 | 6 | | |
| 16 | 1 | 42 | 8 | 70 | 31 | 100 | 2 | 132 | 8 | | |
| 18 | 7 | 43 | 2 | 71 | 10 | 101 | 2 | 133 | 5 | | |
| 19 | 2 | 44 | 2 | 72 | 8 | 102 | 5 | 134 | 4 | | |
| 20 | 4 | 45 | 3 | 73 | 12 | 103 | 8 | 135 | 4 | | |
| 21 | 4 | 46 | 3 | 75 | 2 | 104 | 11 | 136 | 4 | | |
| 22 | 20 | 47 | 1 | 76 | 1 | 105 | 4 | 138 | 2 | | |
| 23 | 4 | 48 | 4 | 79 | 6 | 106 | 4 | 139 | 4 | | |
| 24 | 4 | 49 | 3 | 81 | 8 | 108 | 2 | 140 | 2 | | |
| 25 | 6 | 50 | 3 | 82 | 2 | 109 | 2 | 142 | 8 | | |
| 26 | 14 | 51 | 3 | 84 | 2 | 110 | 2 | 143 | 2 | | |
| 27 | 2 | 53 | 3 | 85 | 4 | 111 | 2 | 145 | 2 | | |
| 28 | 4 | 56 | 3 | 86 | 8 | 114 | 2 | 146 | 6 | | |
| 29 | 14 | 57 | 9 | 87 | 3 | 115 | 4 | 147 | 6 | | |
| 30 | 12 | 58 | 4 | 88 | 6 | 117 | 2 | 149 | 6 | | |
| 31 | 10 | 59 | 15 | 89 | 2 | 118 | 4 | 150 | 4 | | |
| 32 | 2 | 60 | 18 | 90 | 4 | 120 | 8 | 151 | 6 | | |
| 33 | 6 | 61 | 23 | 91 | 3 | 121 | 14 | 153 | 2 | | |
| 34 | 10 | 62 | 21 | 92 | 2 | 122 | 16 | 154 | 2 | | |
| 35 | 9 | 63 | 32 | 93 | 2 | 123 | 4 | 155 | 6 | | |
| 36 | 22 | 64 | 23 | 94 | 4 | 124 | 2 | 156 | 2 | | |

STAGE I WING 6 TGA IGNITION TEMPERATURE, 9 DEGREE C RISE/MINUTE

This sample size summary is applicable to figure 65 .

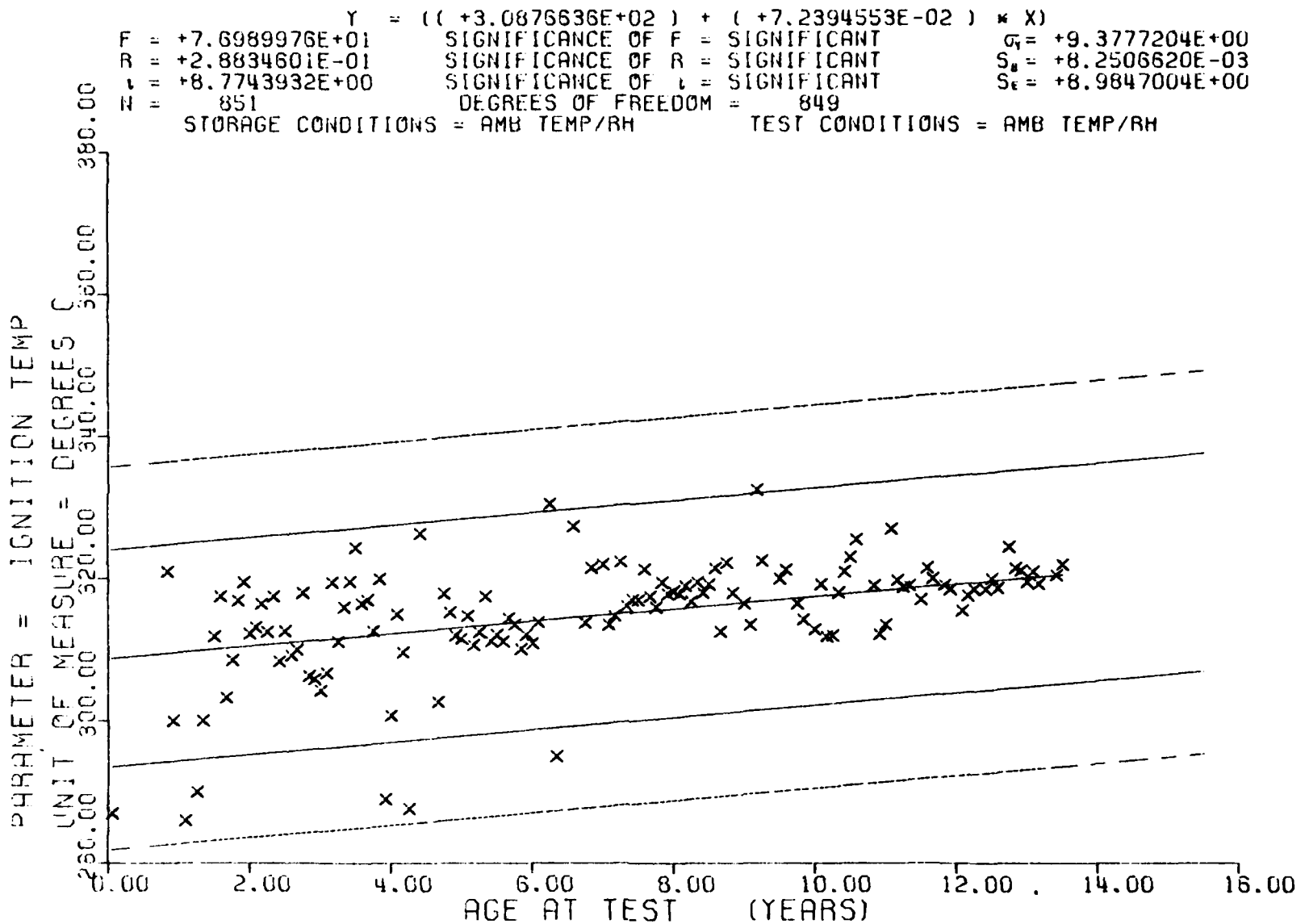

Y = (( +3.0876636E+02 ) + ( +7.2394553E-02 ) * X)
F = +7.6989976E+01 SIGNIFICANCE OF F = SIGNIFICANT
R = +2.8834601E-01 SIGNIFICANCE OF R = SIGNIFICANT
N = 851 DEGREES OF FREEDOM = 849
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = AMB TEMP/RH
PARAMETER = IGNITION TEMP
UNIT OF MEASURE = DEGREES C
280.00
300.00
320.00
340.00
360.00
380.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STAGE I WING G
TGA IGNITION TEMPERATURE, 9 DEGREE C RISE/MINUTE

Figure 65

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 37 | 3 | 65 | 8 | 95 | 3 | 125 | 1 | 157 | 1 |
| 10 | 1 | 38 | 4 | 66 | 12 | 96 | 2 | 126 | 1 | 158 | 2 |
| 11 | 1 | 39 | 5 | 67 | 17 | 97 | 2 | 127 | 1 | 161 | 1 |
| 13 | 1 | 40 | 3 | 68 | 10 | 98 | 2 | 130 | 2 | | |
| 15 | 1 | 41 | 15 | 69 | 8 | 99 | 2 | 131 | 3 | | |
| 16 | 1 | 42 | 3 | 70 | 16 | 100 | 1 | 132 | 4 | | |
| 18 | 4 | 43 | 2 | 71 | 6 | 101 | 1 | 133 | 3 | | |
| 19 | 1 | 44 | 2 | 72 | 5 | 102 | 2 | 134 | 2 | | |
| 20 | 3 | 45 | 1 | 73 | 6 | 103 | 3 | 135 | 2 | | |
| 21 | 2 | 46 | 3 | 75 | 1 | 104 | 5 | 136 | 2 | | |
| 22 | 10 | 47 | 1 | 76 | 1 | 105 | 2 | 138 | 1 | | |
| 23 | 2 | 48 | 4 | 79 | 2 | 106 | 2 | 139 | 2 | | |
| 24 | 2 | 49 | 3 | 81 | 4 | 108 | 1 | 140 | 1 | | |
| 25 | 3 | 50 | 1 | 82 | 1 | 109 | 1 | 142 | 4 | | |
| 26 | 7 | 51 | 3 | 84 | 1 | 110 | 1 | 143 | 1 | | |
| 27 | 1 | 53 | 1 | 85 | 2 | 111 | 1 | 145 | 1 | | |
| 28 | 2 | 56 | 2 | 86 | 4 | 114 | 1 | 146 | 3 | | |
| 29 | 8 | 57 | 4 | 87 | 2 | 115 | 2 | 147 | 3 | | |
| 30 | 6 | 58 | 3 | 88 | 3 | 117 | 1 | 149 | 3 | | |
| 31 | 5 | 59 | 11 | 89 | 1 | 118 | 2 | 150 | 2 | | |
| 32 | 1 | 60 | 12 | 90 | 2 | 120 | 4 | 151 | 3 | | |
| 33 | 3 | 61 | 12 | 91 | 2 | 121 | 7 | 153 | 1 | | |
| 34 | 4 | 62 | 11 | 92 | 1 | 122 | 8 | 154 | 1 | | |
| 35 | 3 | 63 | 17 | 93 | 1 | 123 | 2 | 155 | 3 | | |
| 36 | 7 | 64 | 11 | 94 | 2 | 124 | 1 | 156 | 1 | | |

1
66
1

SAGE I WING G TGA % WT LOSS AT 250 DEG C HOLD, 12 DEG RISE/MIN TO HOLD

This sample size summary is applicable to figure 66

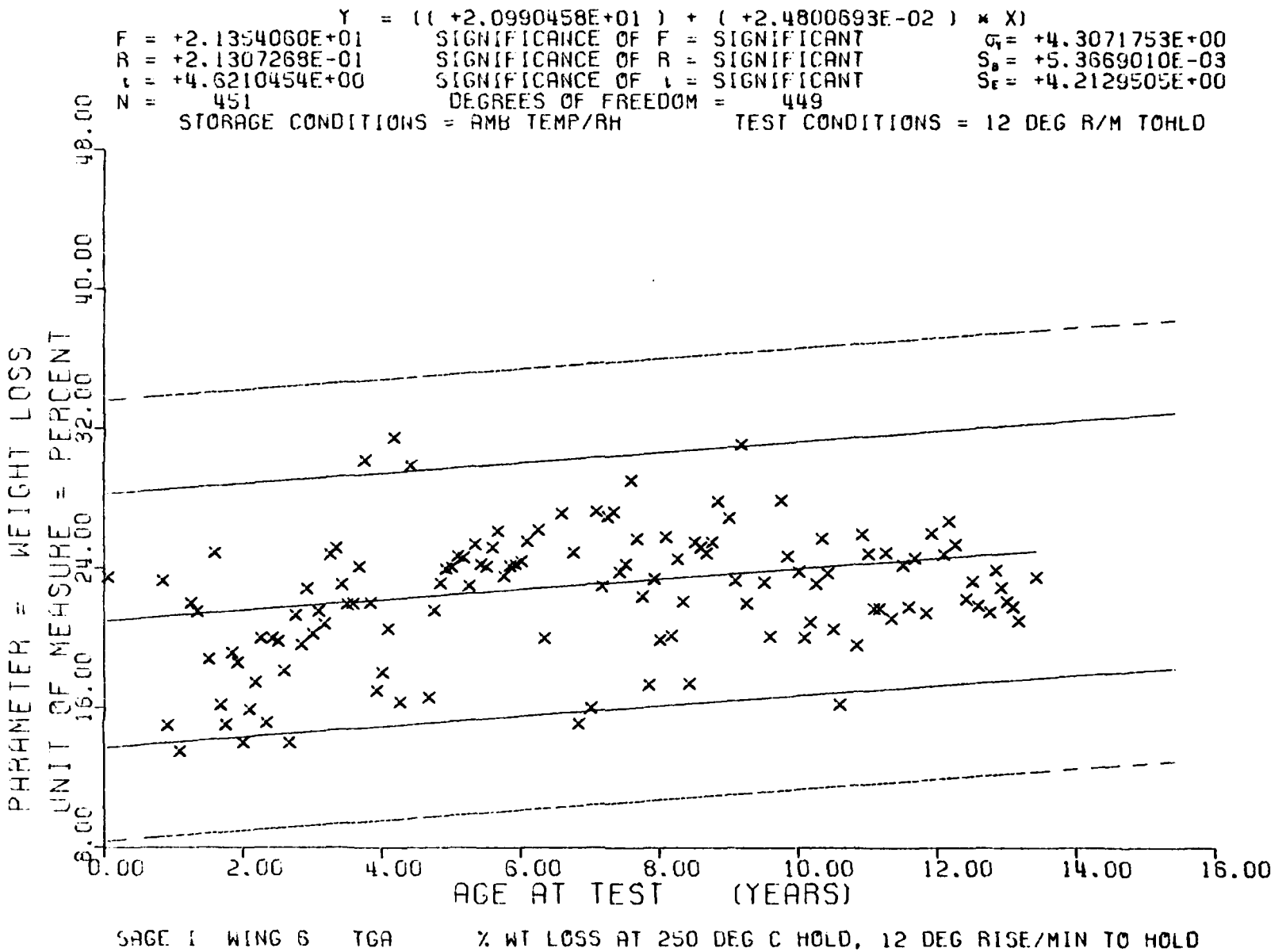

Y = (( +2.0990458E+01 ) + ( +2.4800693E-02 ) * X)
F = +2.1354060E+01 SIGNIFICANCE OF F = SIGNIFICANT σ1 = +4.3071753E+00
R = +2.1307268E-01 SIGNIFICANCE OF R = SIGNIFICANT Sb = +5.3669010E-03
t = +4.6210454E+00 SIGNIFICANCE OF t = SIGNIFICANT Se = +4.2129505E+00
N = 451 DEGREES OF FREEDOM = 449
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 12 DEG R/M TOHLD
PARAMETER = WEIGHT LOSS
UNIT OF MEASURE = PERCENT
48.00
40.00
32.00
24.00
16.00
8.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
SAGE I WING 6 TGA % WT LOSS AT 250 DEG C HOLD, 12 DEG RISE/MIN TO HOLD

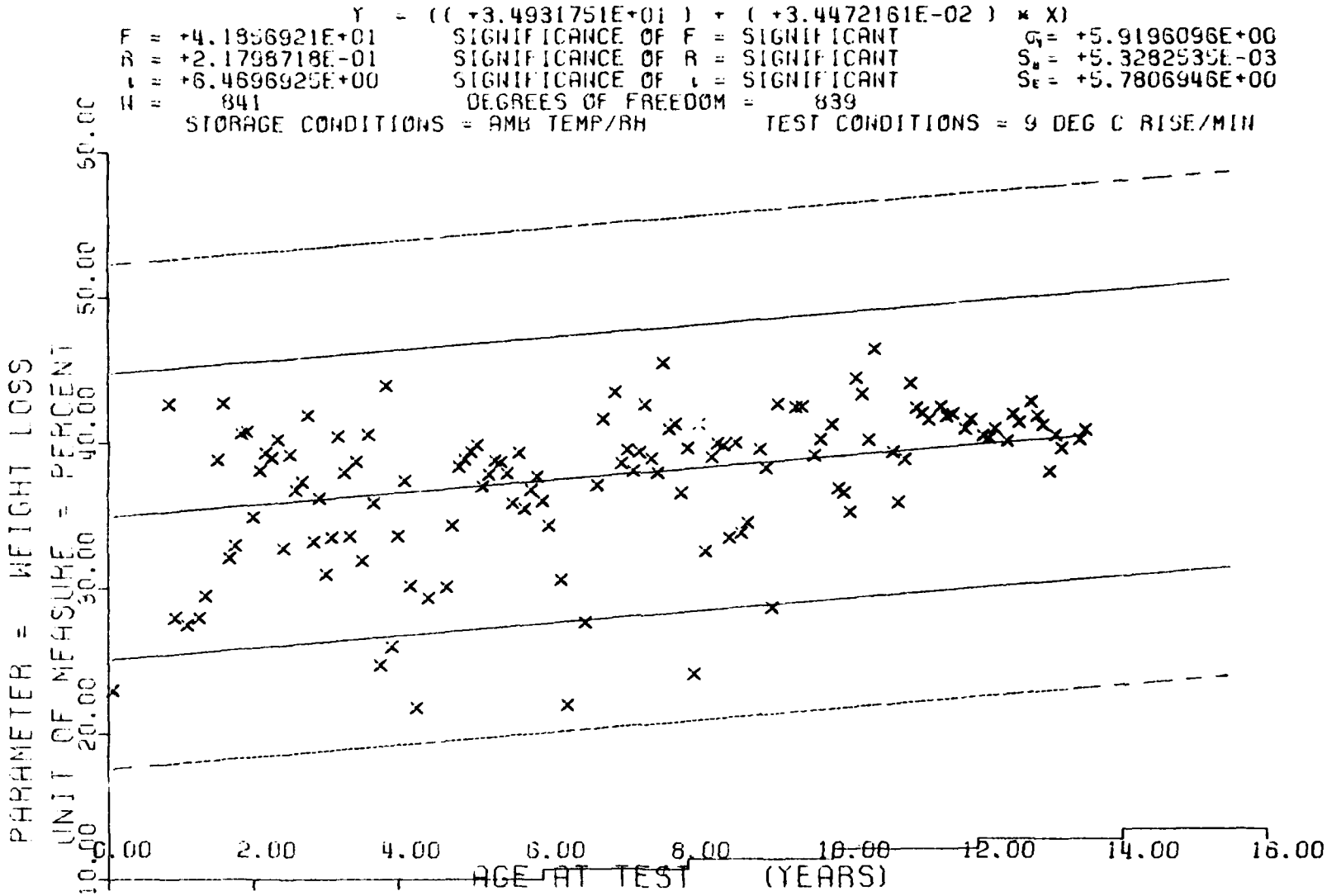
Figure 66

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP | AGE (MOS) | NO SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 37 | 13 | 65 | 14 | 95 | 7 | 125 | 2 | 157 | 2 |
| 10 | 1 | 38 | 4 | 66 | 23 | 96 | 4 | 126 | 2 | 158 | 4 |
| 11 | 1 | 39 | 5 | 67 | 34 | 97 | 5 | 127 | 2 | 161 | 2 |
| 13 | 1 | 40 | 4 | 68 | 20 | 98 | 4 | 130 | 4 | 162 | 1 |
| 15 | 1 | 41 | 17 | 69 | 16 | 99 | 4 | 131 | 6 | | |
| 16 | 1 | 42 | 5 | 70 | 31 | 100 | 2 | 132 | 8 | | |
| 18 | 7 | 43 | 2 | 71 | 10 | 101 | 2 | 133 | 5 | | |
| 19 | 2 | 44 | 2 | 72 | 8 | 102 | 5 | 134 | 4 | | |
| 20 | 4 | 45 | 2 | 73 | 12 | 103 | 7 | 135 | 4 | | |
| 21 | 4 | 46 | 3 | 75 | 2 | 104 | 9 | 136 | 4 | | |
| 22 | 21 | 47 | 1 | 76 | 1 | 105 | 4 | 138 | 2 | | |
| 23 | 4 | 48 | 4 | 79 | 6 | 106 | 4 | 139 | 4 | | |
| 24 | 4 | 49 | 3 | 81 | 8 | 108 | 2 | 140 | 2 | | |
| 25 | 6 | 50 | 2 | 82 | 2 | 109 | 2 | 142 | 8 | | |
| 26 | 14 | 51 | 3 | 84 | 2 | 110 | 2 | 143 | 2 | | |
| 27 | 2 | 53 | 3 | 85 | 4 | 111 | 2 | 145 | 2 | | |
| 28 | 4 | 56 | 3 | 86 | 8 | 114 | 2 | 146 | 6 | | |
| 29 | 14 | 57 | 9 | 87 | 3 | 115 | 4 | 147 | 6 | | |
| 30 | 12 | 58 | 4 | 88 | 6 | 117 | 2 | 149 | 6 | | |
| 31 | 12 | 59 | 13 | 89 | 2 | 118 | 4 | 150 | 4 | | |
| 32 | 2 | 60 | 18 | 90 | 4 | 120 | 8 | 151 | 6 | | |
| 33 | 6 | 61 | 23 | 91 | 3 | 121 | 14 | 153 | 2 | | |
| 34 | 10 | 62 | 21 | 92 | 2 | 122 | 16 | 154 | 2 | | |
| 35 | 9 | 63 | 32 | 93 | 2 | 123 | 4 | 155 | 6 | | |
| 36 | 22 | 64 | 23 | 94 | 4 | 124 | 2 | 156 | 2 | | |

STAGE 1 WING 6 TGA PERCENT WEIGHT LOSS AT IGNITION, 9 DEG C RISE/MIN

This sample size summary is applicable to figure 67




STAGE I WING 6 TGA PERCENT WEIGHT LOSS AT IGNITION, 9 DEG C RISE/MIN

Figure 67

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 9 | 30 | 29 | 55 | 15 | 80 | 34 | 105 | 8 | 130 | 62 |
| 6 | 27 | 31 | 28 | 56 | 32 | 81 | 35 | 106 | 15 | 131 | 39 |
| 7 | 11 | 32 | 23 | 57 | 27 | 82 | 30 | 107 | 4 | 132 | 24 |
| 8 | 14 | 33 | 19 | 58 | 41 | 83 | 29 | 108 | 14 | 133 | 16 |
| 9 | 12 | 34 | 33 | 59 | 33 | 84 | 18 | 109 | 13 | 134 | 6 |
| 10 | 3 | 35 | 24 | 60 | 43 | 85 | 20 | 110 | 4 | 135 | 10 |
| 11 | 3 | 36 | 35 | 61 | 41 | 86 | 16 | 111 | 6 | 136 | 8 |
| 12 | 24 | 37 | 24 | 62 | 35 | 87 | 19 | 112 | 12 | 137 | 8 |
| 13 | 15 | 38 | 9 | 63 | 46 | 88 | 20 | 113 | 37 | 138 | 8 |
| 14 | 18 | 39 | 22 | 64 | 24 | 89 | 32 | 114 | 58 | 139 | 6 |
| 15 | 8 | 40 | 21 | 65 | 30 | 90 | 32 | 115 | 33 | 140 | 8 |
| 16 | 29 | 41 | 5 | 66 | 30 | 91 | 13 | 116 | 9 | 141 | 8 |
| 17 | 14 | 42 | 11 | 67 | 59 | 92 | 14 | 117 | 21 | 142 | 20 |
| 18 | 30 | 43 | 12 | 68 | 30 | 93 | 15 | 118 | 42 | 143 | 40 |
| 19 | 10 | 44 | 6 | 69 | 40 | 94 | 15 | 119 | 2 | 144 | 14 |
| 20 | 11 | 45 | 9 | 70 | 68 | 95 | 10 | 120 | 14 | 146 | 8 |
| 21 | 24 | 46 | 15 | 71 | 48 | 96 | 31 | 121 | 12 | 147 | 6 |
| 22 | 16 | 47 | 47 | 72 | 18 | 97 | 41 | 122 | 13 | 149 | 14 |
| 23 | 13 | 48 | 41 | 73 | 20 | 98 | 34 | 123 | 3 | 151 | 4 |
| 24 | 9 | 49 | 38 | 74 | 15 | 99 | 27 | 124 | 10 | 153 | 2 |
| 25 | 27 | 50 | 27 | 75 | 21 | 100 | 20 | 125 | 17 | 154 | 2 |
| 26 | 20 | 51 | 22 | 76 | 18 | 101 | 15 | 126 | 17 | 155 | 6 |
| 27 | 20 | 52 | 27 | 77 | 9 | 102 | 10 | 127 | 3 | 156 | 2 |
| 28 | 25 | 53 | 33 | 78 | 22 | 103 | 18 | 128 | 23 | 157 | 5 |
| 29 | 20 | 54 | 10 | 79 | 26 | 104 | 10 | 129 | 11 | 159 | 2 |
| | | | | | | | | | | 161 | 2 |

STAGE 1 WING 6, TF-H 1011, DTA, EXOTHERM 1, 12 DEGREE CENTIGRADE RISE/MIN

This sample size summary is applicable to figures 68 and 69

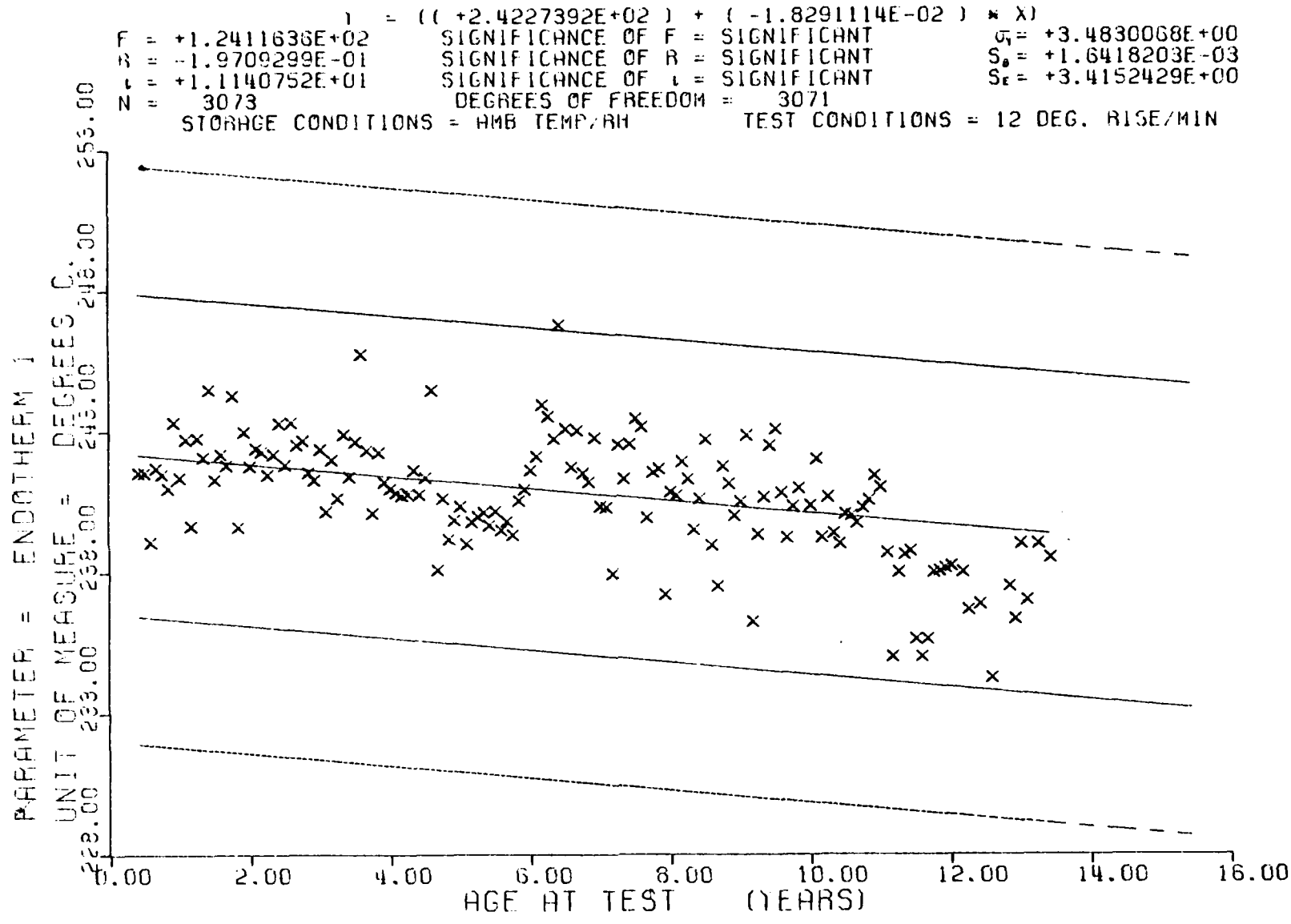
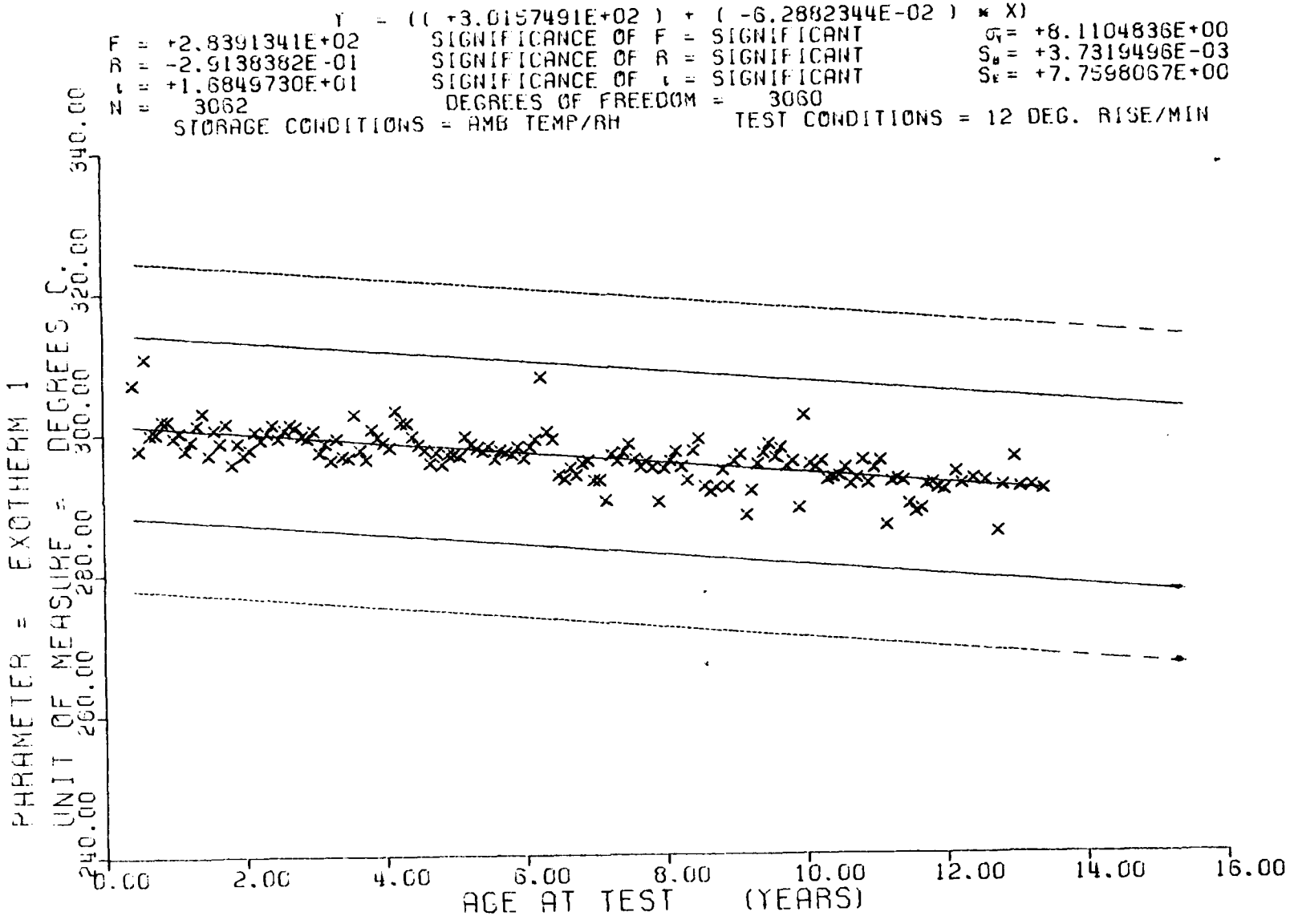

Y = (( +2.4227392E+02 ) + ( -1.8291114E-02 ) * X)
F = +1.2411636E+02 SIGNIFICANCE OF F = SIGNIFICANT σ1 = +3.4830068E+00
R = -1.9709299E-01 SIGNIFICANCE OF R = SIGNIFICANT Sθ = +1.6418203E-03
t = +1.1140752E+01 SIGNIFICANCE OF t = SIGNIFICANT Sε = +3.4152429E+00
N = 3073 DEGREES OF FREEDOM = 3071
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 12 DEG. RISE/MIN
PARAMETER = ENDOTHERM 1
UNIT OF MEASURE = DEGREES C.
253.00
248.00
243.00
238.00
233.00
228.00
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STAGE 1 WING 6, TP-H 1011, DTA, ENDOTHERM 1, 12 DEGREE CENTIGRADE RISE/MIN

Figure 68




STAGE 1 WING 3, TP-H 1011, DTA, EXOTHERM 1, 12 DEGREE CENTIGRADE RISE/MIN

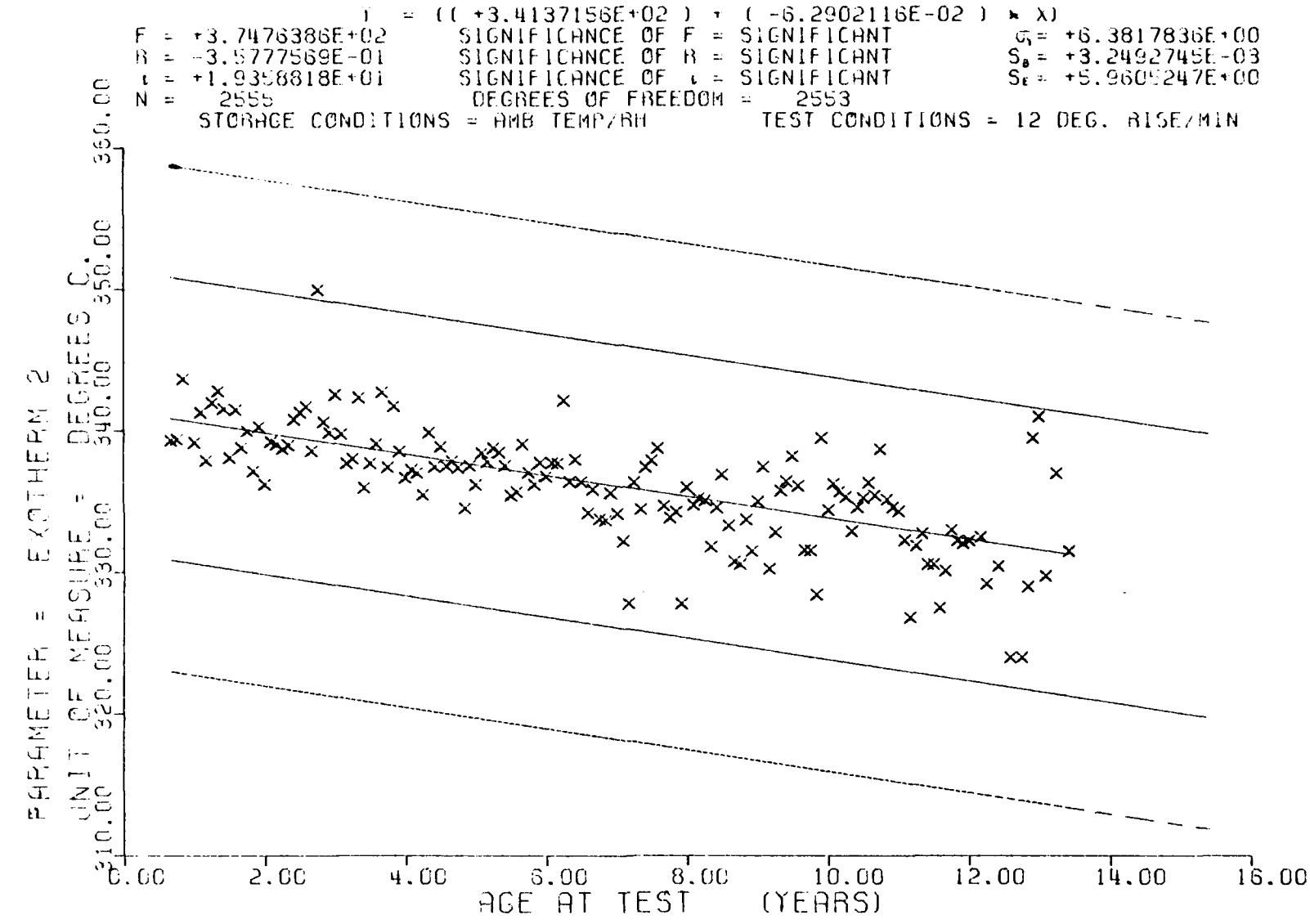
Figure 69

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 3 | 34 | 26 | 59 | 29 | 84 | 16 | 109 | 13 | 134 | 5 |
| 9 | 5 | 35 | 21 | 60 | 42 | 85 | 16 | 110 | 4 | 135 | 9 |
| 10 | 3 | 36 | 29 | 61 | 34 | 86 | 15 | 111 | 6 | 136 | 8 |
| 12 | 17 | 37 | 19 | 62 | 29 | 87 | 17 | 112 | 9 | 137 | 7 |
| 13 | 10 | 38 | 7 | 63 | 36 | 88 | 18 | 113 | 35 | 138 | 7 |
| 14 | 9 | 39 | 18 | 64 | 16 | 89 | 32 | 114 | 57 | 139 | 6 |
| 15 | 5 | 40 | 19 | 65 | 22 | 90 | 31 | 115 | 29 | 140 | 8 |
| 16 | 22 | 41 | 5 | 66 | 24 | 91 | 13 | 116 | 7 | 141 | 7 |
| 17 | 14 | 42 | 11 | 67 | 48 | 92 | 13 | 117 | 20 | 142 | 16 |
| 18 | 18 | 43 | 10 | 68 | 26 | 93 | 14 | 118 | 41 | 143 | 35 |
| 19 | 4 | 44 | 4 | 69 | 29 | 94 | 14 | 119 | 2 | 144 | 12 |
| 20 | 11 | 45 | 9 | 70 | 56 | 95 | 9 | 120 | 10 | 146 | 8 |
| 21 | 22 | 46 | 9 | 71 | 47 | 96 | 28 | 121 | 12 | 147 | 5 |
| 22 | 13 | 47 | 42 | 72 | 15 | 97 | 33 | 122 | 13 | 149 | 13 |
| 23 | 10 | 48 | 31 | 73 | 16 | 98 | 32 | 123 | 3 | 151 | 3 |
| 24 | 9 | 49 | 30 | 74 | 14 | 99 | 25 | 124 | 9 | 153 | 2 |
| 25 | 20 | 50 | 17 | 75 | 17 | 100 | 16 | 125 | 17 | 154 | 2 |
| 26 | 16 | 51 | 14 | 76 | 16 | 101 | 14 | 126 | 16 | 155 | 6 |
| 27 | 13 | 52 | 18 | 77 | 9 | 102 | 10 | 127 | 3 | 156 | 2 |
| 28 | 19 | 53 | 25 | 78 | 21 | 103 | 17 | 128 | 19 | 157 | 4 |
| 29 | 18 | 54 | 9 | 79 | 26 | 104 | 9 | 129 | 10 | 159 | 2 |
| 30 | 22 | 55 | 15 | 80 | 34 | 105 | 7 | 130 | 50 | 161 | 2 |
| 31 | 21 | 56 | 30 | 81 | 33 | 106 | 15 | 131 | 37 | | |
| 32 | 22 | 57 | 25 | 82 | 30 | 107 | 2 | 132 | 22 | | |
| 33 | 11 | 58 | 27 | 83 | 26 | 108 | 12 | 133 | 14 | | |

STAGE 1 WING 6, TR-H 1011, DTA, EXOTHERM 2, 12 DEGREE CENTIGRADE RISE/MIN

This sample size summary is applicable to figure 70




STAGE 1 WING 6, TP-H 1011, DTA, EXOTHERM 2, 12 DEGREE CENTIGRADE RISE/MIN

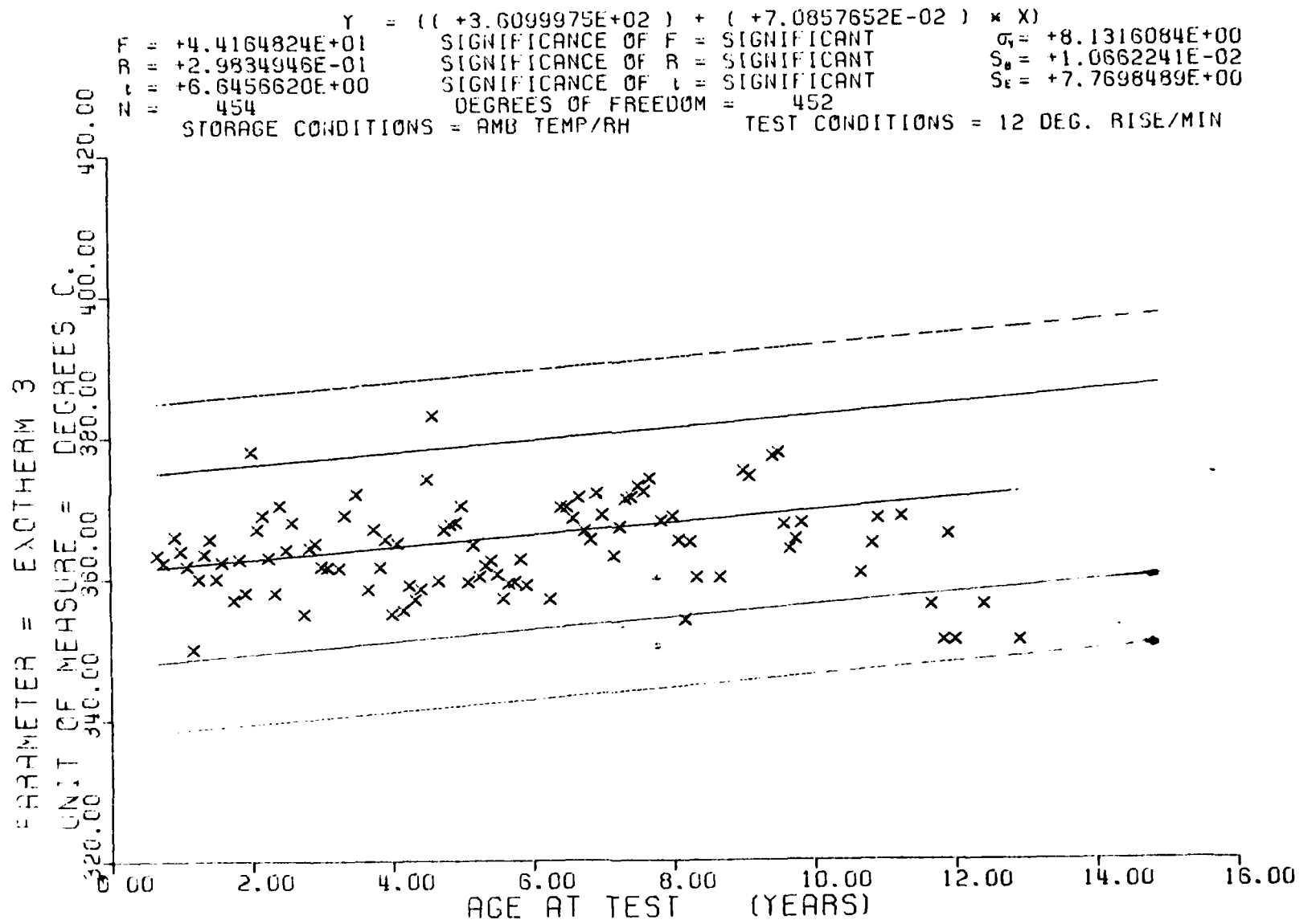
Figure 70

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|
| 8 | 3 | 36 | 4 | 64 | 4 | 96 | 6 |
| 9 | 7 | 37 | 5 | 65 | 7 | 97 | 4 |
| 11 | 3 | 39 | 2 | 66 | 4 | 98 | 1 |
| 12 | 4 | 40 | 5 | 67 | 9 | 99 | 1 |
| 13 | 5 | 42 | 3 | 68 | 4 | 100 | 1 |
| 14 | 3 | 44 | 2 | 69 | 7 | 104 | 1 |
| 15 | 1 | 45 | 1 | 70 | 3 | 108 | 3 |
| 16 | 4 | 46 | 5 | 71 | 2 | 109 | 4 |
| 17 | 5 | 47 | 7 | 75 | 1 | 110 | 1 |
| 18 | 5 | 48 | 8 | 77 | 1 | 113 | 11 |
| 19 | 6 | 49 | 2 | 78 | 3 | 114 | 21 |
| 21 | 2 | 50 | 2 | 79 | 18 | 115 | 7 |
| 22 | 4 | 51 | 1 | 80 | 12 | 116 | 2 |
| 23 | 1 | 52 | 3 | 81 | 10 | 117 | 3 |
| 24 | 1 | 53 | 4 | 82 | 8 | 118 | 3 |
| 25 | 1 | 54 | 1 | 83 | 8 | 128 | 2 |
| 26 | 2 | 55 | 1 | 84 | 7 | 130 | 9 |
| 27 | 4 | 56 | 3 | 86 | 1 | 131 | 4 |
| 28 | 3 | 57 | 7 | 87 | 8 | 135 | 2 |
| 29 | 5 | 58 | 5 | 88 | 8 | 140 | 1 |
| 30 | 9 | 59 | 7 | 89 | 16 | 142 | 2 |
| 31 | 4 | 60 | 4 | 90 | 12 | 143 | 4 |
| 33 | 4 | 61 | 7 | 91 | 6 | 144 | 1 |
| 34 | 5 | 62 | 6 | 92 | 2 | 149 | 1 |
| 35 | 4 | 63 | 5 | 94 | 2 | 155 | 1 |

STAGE 1 WING 6, TF-H 1011, DTA, EXOTHERM 3, 12 DEGREE CENTIGRADE RISE/MIN

This sample size summary is applicable to figure 71




STAGE 1 WING 6, TP-H 1011, DTA, EXOTHERM 3, 12 DEGREE CENTIGRADE RISE/MIN

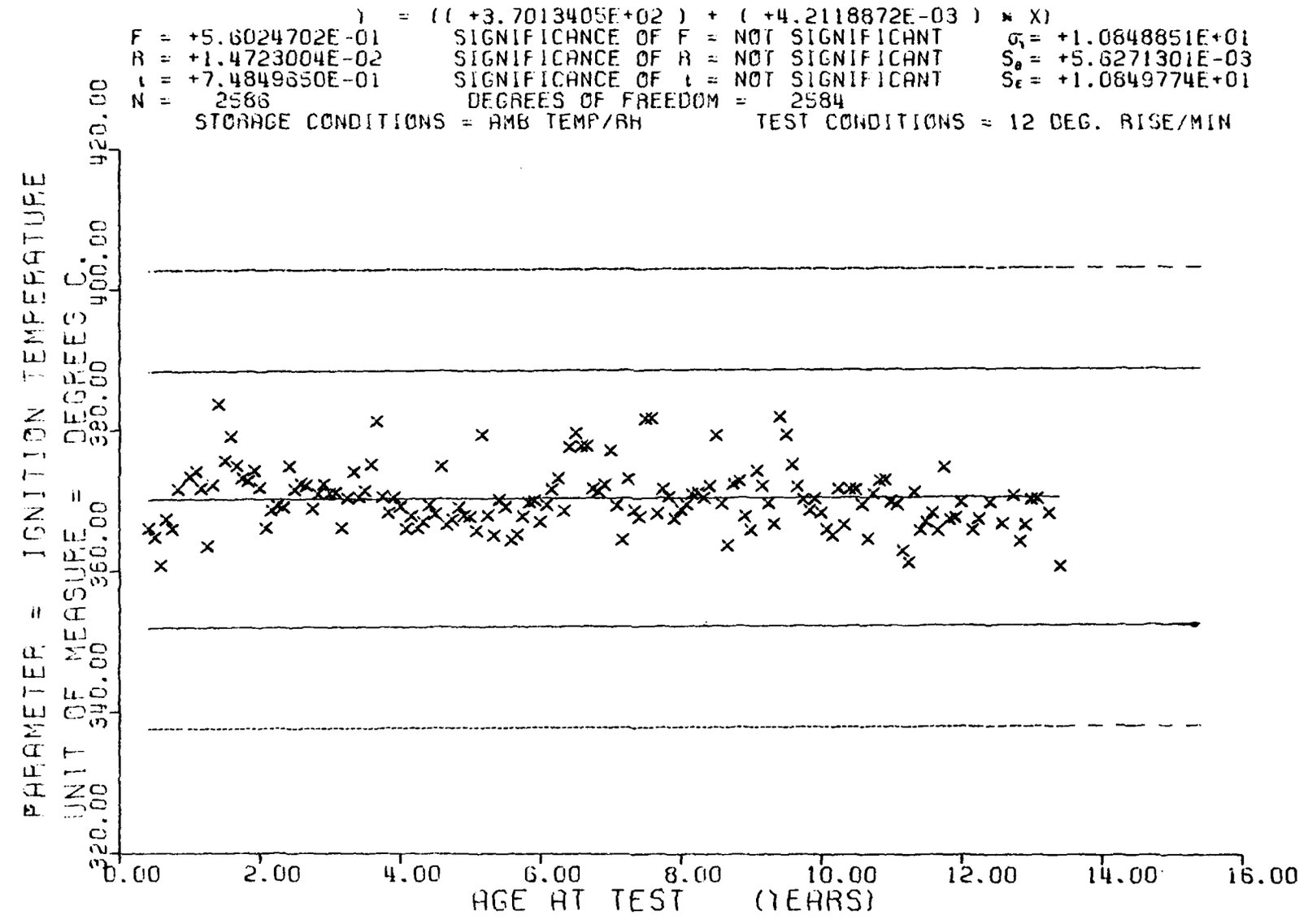
Figure 71

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 9 | 31 | 25 | 56 | 29 | 81 | 25 | 106 | 12 | 131 | 33 |
| 6 | 27 | 32 | 23 | 57 | 29 | 82 | 22 | 107 | 4 | 132 | 24 |
| 7 | 11 | 33 | 15 | 58 | 36 | 83 | 22 | 108 | 11 | 133 | 16 |
| 8 | 11 | 34 | 28 | 59 | 26 | 84 | 13 | 109 | 9 | 134 | 6 |
| 9 | 5 | 35 | 21 | 60 | 39 | 85 | 20 | 110 | 3 | 135 | 8 |
| 10 | 3 | 36 | 28 | 61 | 33 | 86 | 15 | 111 | 6 | 136 | 8 |
| 12 | 20 | 37 | 18 | 62 | 27 | 87 | 13 | 112 | 10 | 137 | 8 |
| 13 | 10 | 38 | 9 | 63 | 42 | 88 | 13 | 113 | 29 | 138 | 8 |
| 14 | 17 | 39 | 20 | 64 | 20 | 89 | 16 | 114 | 37 | 139 | 6 |
| 15 | 7 | 40 | 16 | 65 | 23 | 90 | 23 | 115 | 27 | 140 | 5 |
| 16 | 23 | 41 | 5 | 66 | 26 | 91 | 9 | 116 | 8 | 141 | 4 |
| 17 | 10 | 42 | 8 | 67 | 48 | 92 | 12 | 117 | 19 | 142 | 16 |
| 18 | 25 | 43 | 11 | 68 | 25 | 93 | 15 | 118 | 39 | 143 | 38 |
| 19 | 6 | 44 | 5 | 69 | 34 | 94 | 13 | 119 | 2 | 144 | 14 |
| 20 | 2 | 45 | 7 | 70 | 67 | 95 | 10 | 120 | 14 | 146 | 8 |
| 21 | 12 | 46 | 10 | 71 | 46 | 96 | 25 | 121 | 12 | 147 | 6 |
| 22 | 7 | 47 | 40 | 72 | 18 | 97 | 33 | 122 | 13 | 149 | 14 |
| 23 | 12 | 48 | 31 | 73 | 29 | 98 | 32 | 123 | 3 | 151 | 4 |
| 24 | 8 | 49 | 35 | 74 | 15 | 99 | 20 | 124 | 10 | 153 | 2 |
| 25 | 26 | 50 | 23 | 75 | 20 | 100 | 19 | 125 | 17 | 154 | 2 |
| 26 | 18 | 51 | 23 | 76 | 18 | 101 | 15 | 126 | 17 | 155 | 6 |
| 27 | 18 | 52 | 28 | 77 | 3 | 102 | 8 | 127 | 3 | 156 | 2 |
| 28 | 22 | 53 | 31 | 78 | 19 | 103 | 17 | 128 | 21 | 157 | 5 |
| 29 | 15 | 54 | 11 | 79 | 9 | 104 | 8 | 129 | 11 | 159 | 2 |
| 30 | 20 | 55 | 15 | 80 | 23 | 105 | 5 | 130 | 58 | 161 | 2 |

STAGE 1 WING C, TP-H 1011, DTA, IGNITION TEMPERATURE, 12 DEGREE CENT. RISE/MIN

This sample size summary is applicable to figure 72




STAGE 1 WING 6, TP-H 1011, DTA, IGNITION TEMPERATURE, 12 DEGREE CENT. RISE/MIN

Figure 72

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 40 | 33 | 70 | 33 | 95 | 20 | 121 | 27 | 146 | 36 |
| 15 | 3 | 41 | 6 | 71 | 25 | 96 | 24 | 122 | 21 | 147 | 12 |
| 16 | 9 | 42 | 19 | 72 | 54 | 97 | 24 | 123 | 9 | 149 | 9 |
| 17 | 15 | 45 | 3 | 73 | 50 | 98 | 35 | 124 | 5 | 150 | 9 |
| 18 | 12 | 47 | 9 | 74 | 74 | 99 | 39 | 125 | 6 | 151 | 9 |
| 19 | 12 | 50 | 12 | 75 | 69 | 100 | 22 | 126 | 12 | 152 | 6 |
| 20 | 18 | 51 | 12 | 76 | 36 | 101 | 8 | 127 | 22 | 154 | 6 |
| 21 | 3 | 52 | 22 | 77 | 21 | 102 | 18 | 128 | 12 | 155 | 3 |
| 22 | 3 | 53 | 24 | 78 | 8 | 103 | 6 | 129 | 39 | 156 | 3 |
| 24 | 3 | 54 | 26 | 79 | 39 | 104 | 9 | 130 | 54 | 157 | 3 |
| 25 | 3 | 55 | 24 | 80 | 15 | 105 | 9 | 131 | 86 | 158 | 6 |
| 26 | 8 | 56 | 17 | 81 | 34 | 107 | 6 | 132 | 24 | 159 | 3 |
| 27 | 24 | 57 | 27 | 82 | 24 | 108 | 6 | 133 | 17 | 162 | 2 |
| 28 | 27 | 58 | 45 | 83 | 15 | 109 | 5 | 134 | 15 | | |
| 29 | 46 | 59 | 42 | 84 | 9 | 110 | 3 | 135 | 24 | | |
| 30 | 18 | 60 | 44 | 85 | 18 | 111 | 15 | 136 | 15 | | |
| 31 | 42 | 61 | 33 | 86 | 12 | 112 | 14 | 137 | 9 | | |
| 32 | 31 | 62 | 67 | 87 | 6 | 113 | 18 | 138 | 9 | | |
| 33 | 43 | 63 | 51 | 88 | 15 | 114 | 54 | 139 | 50 | | |
| 34 | 29 | 64 | 50 | 89 | 16 | 115 | 55 | 140 | 24 | | |
| 35 | 43 | 65 | 37 | 90 | 28 | 116 | 22 | 141 | 27 | | |
| 36 | 50 | 66 | 15 | 91 | 19 | 117 | 24 | 142 | 18 | | |
| 37 | 24 | 67 | 24 | 92 | 26 | 118 | 28 | 143 | 12 | | |
| 38 | 19 | 68 | 30 | 93 | 9 | 119 | 27 | 144 | 30 | | |
| 39 | 21 | 69 | 27 | 94 | 6 | 120 | 79 | 145 | 27 | | |

STAGE 1 WING 6 TE-H1011 BURNING RATE AT 1000 PSI

This sample size summary is applicable to figure 73

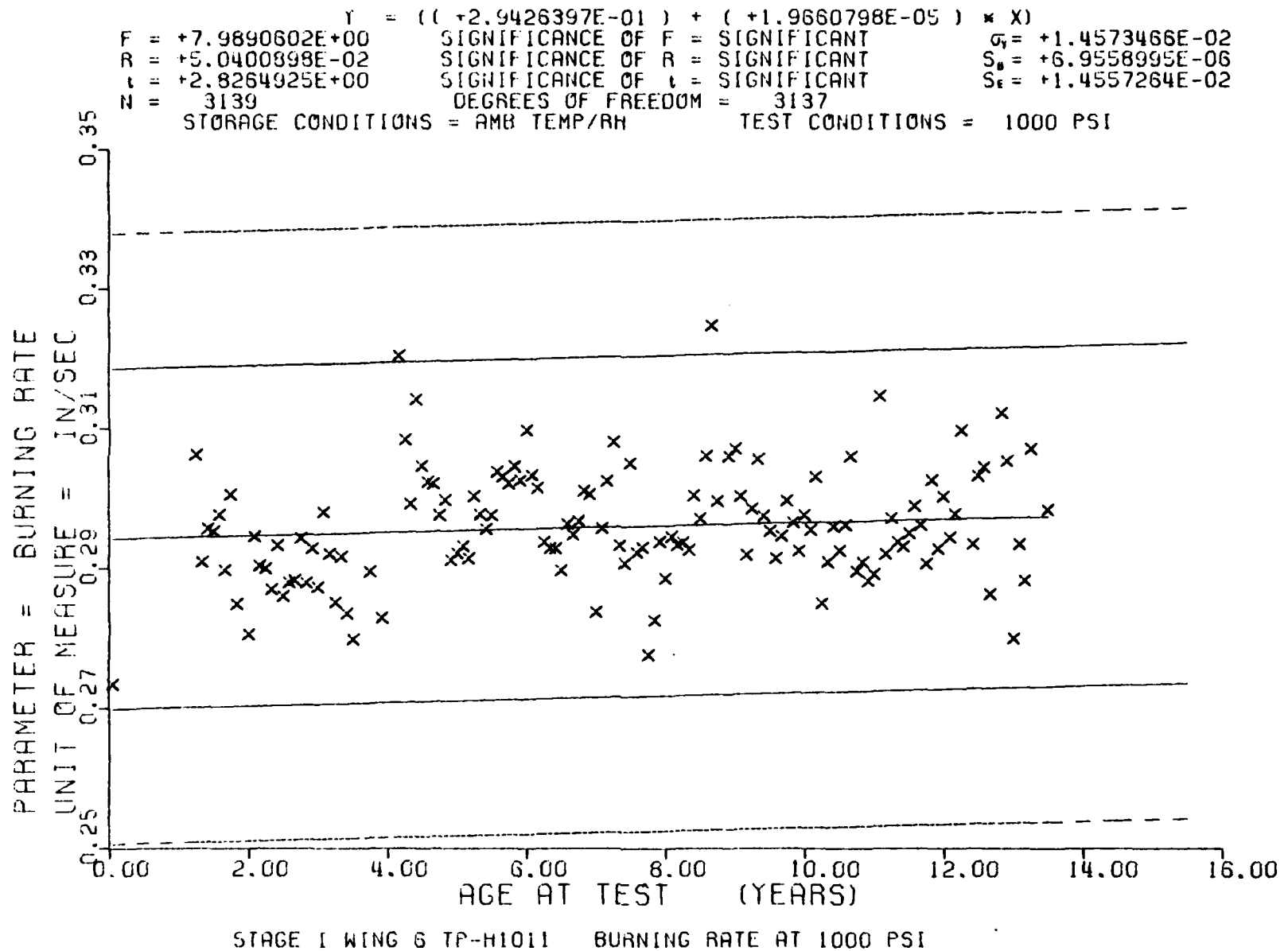

Y = (( +2.9426397E-01 ) + ( +1.9660798E-05 ) * X)
F = +7.9890602E+00 SIGNIFICANCE OF F = SIGNIFICANT σ_Y = +1.4573466E-02
R = +5.0400898E-02 SIGNIFICANCE OF R = SIGNIFICANT S_B = +6.9558995E-06
t = +2.8264925E+00 SIGNIFICANCE OF t = SIGNIFICANT S_E = +1.4557264E-02
N = 3139 DEGREES OF FREEDOM = 3137
STORAGE CONDITIONS = AMB TEMP/RH TEST CONDITIONS = 1000 PSI
PARAMETER = BURNING RATE
UNIT OF MEASURE = IN/SEC
0.35
0.33
0.31
0.29
0.27
0.25
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
16.00
AGE AT TEST (YEARS)
STAGE I WING 6 TP-H1011 BURNING RATE AT 1000 PSI

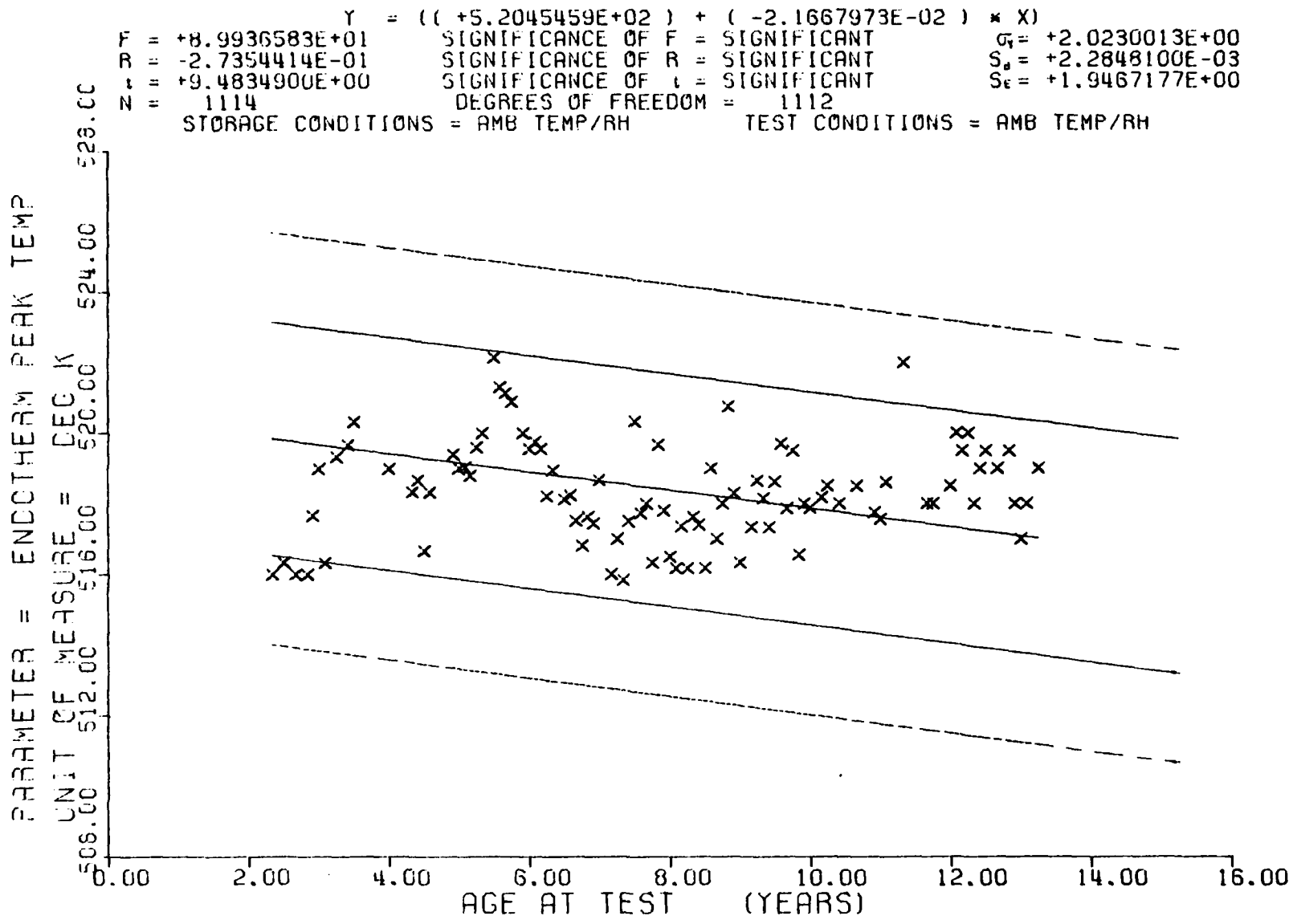
Figure 73

*** SAMPLE SIZE SUMMARY ***

| AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP | AGE (MOS) | NR SAMP |
|---|---|---|---|---|---|---|---|
| 28 | 6 | 71 | 17 | 98 | 14 | 128 | 2 |
| 30 | 3 | 72 | 16 | 99 | 18 | 131 | 8 |
| 32 | 2 | 73 | 21 | 100 | 8 | 132 | 54 |
| 34 | 2 | 74 | 11 | 101 | 5 | 133 | 5 |
| 35 | 3 | 75 | 14 | 102 | 6 | 136 | 2 |
| 36 | 7 | 76 | 20 | 103 | 3 | 140 | 2 |
| 37 | 3 | 78 | 30 | 104 | 7 | 141 | 2 |
| 39 | 6 | 79 | 42 | 105 | 8 | 144 | 2 |
| 41 | 3 | 80 | 56 | 106 | 4 | 145 | 2 |
| 42 | 3 | 81 | 42 | 107 | 7 | 146 | 2 |
| 48 | 3 | 82 | 32 | 108 | 3 | 147 | 2 |
| 52 | 3 | 83 | 50 | 110 | 3 | 148 | 2 |
| 53 | 3 | 84 | 3 | 111 | 34 | 149 | 2 |
| 54 | 3 | 86 | 5 | 112 | 13 | 150 | 2 |
| 55 | 3 | 87 | 2 | 113 | 6 | 152 | 2 |
| 59 | 10 | 88 | 6 | 114 | 13 | 154 | 2 |
| 60 | 18 | 89 | 2 | 115 | 23 | 155 | 2 |
| 61 | 21 | 90 | 3 | 116 | 14 | 156 | 5 |
| 62 | 15 | 91 | 15 | 117 | 6 | 157 | 2 |
| 63 | 5 | 92 | 5 | 118 | 44 | 159 | 2 |
| 64 | 3 | 93 | 6 | 119 | 22 | | |
| 66 | 14 | 94 | 3 | 120 | 8 | | |
| 67 | 54 | 95 | 5 | 122 | 6 | | |
| 68 | 78 | 96 | 12 | 123 | 2 | | |
| 69 | 36 | 97 | 6 | 125 | 2 | | |

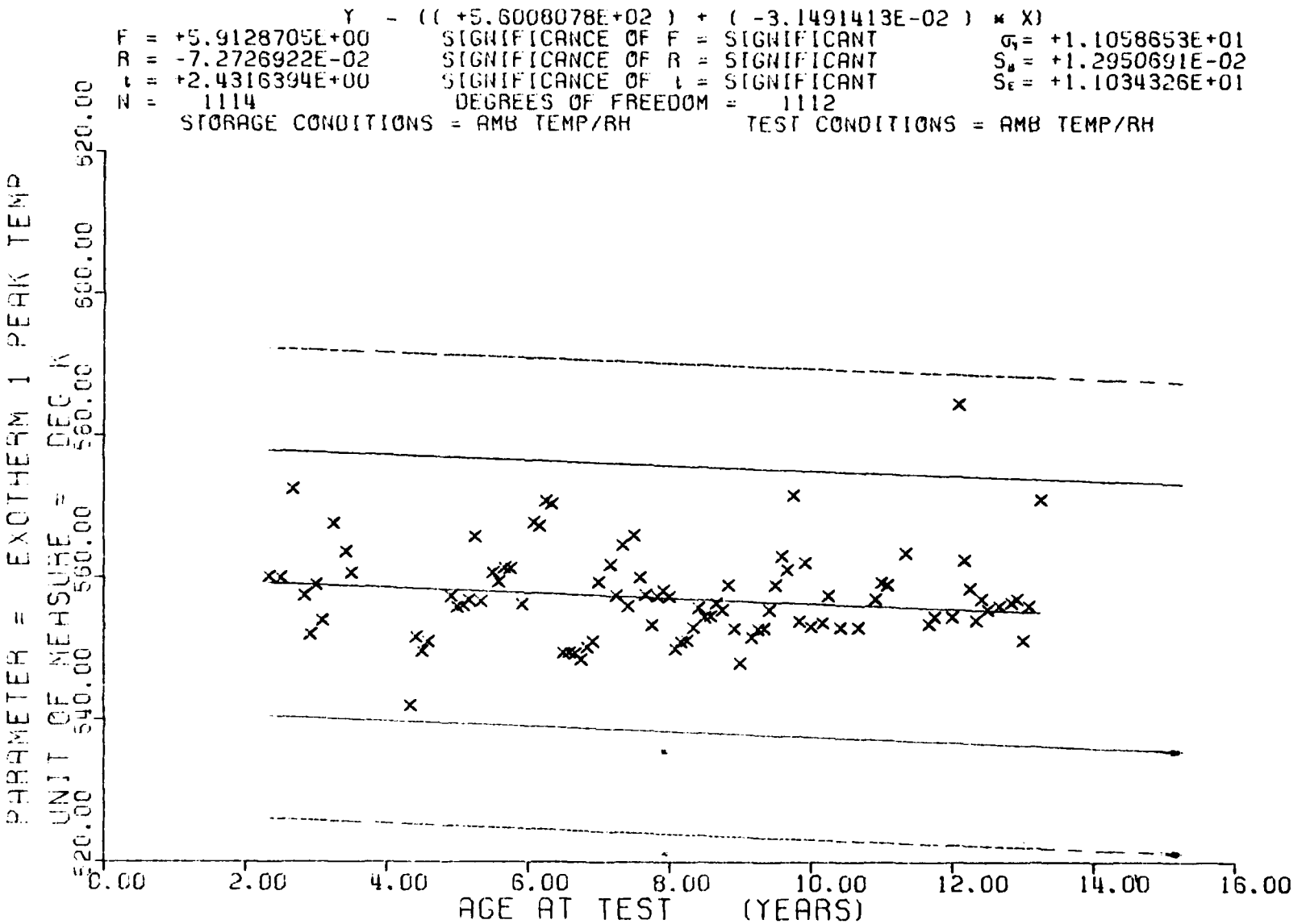
STAGE I WING 6 DIFFERENTIAL SCANNING CALORIMETER EXOTHERM 2 PEAK TEMP

This sample size summary is applicable to figures 74 thru 76



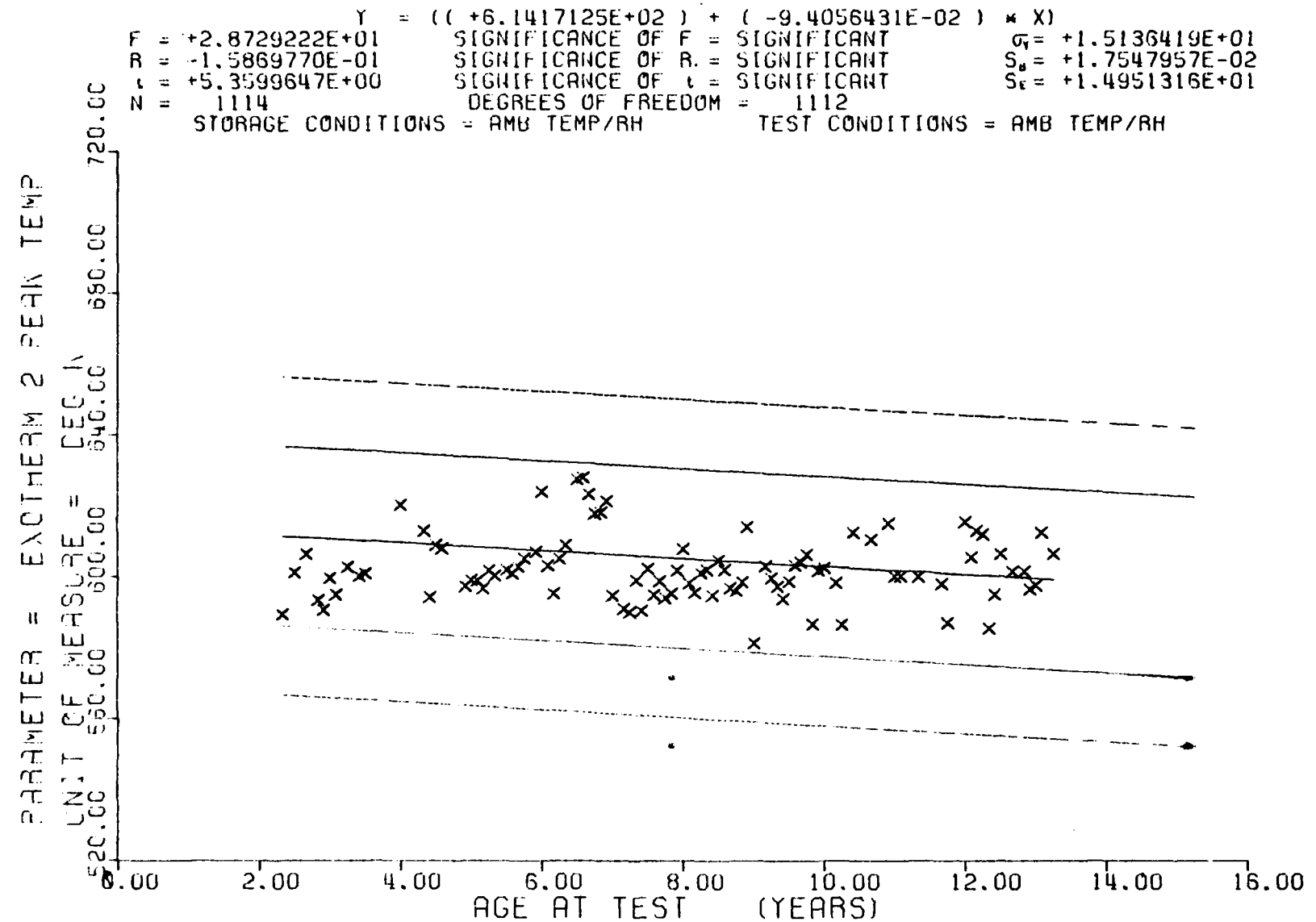

STAGE I WING 6 DIFFERENTIAL SCANNING CALORIMETER ENDOTHERM PEAK TEMP

Figure 74




STAGE I WING 6 DIFFERENTIAL SCANNING CALORIMETER EXOTHERM 1 PEAK TEMP

Figure 75




STAGE I WING 6 DIFFERENTIAL SCANNING CALORIMETER EXOTHERM 2 PEAK TEMP

Figure 76

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| 4. TITLE (and Subtitle): Propellant Surveillance Report LGM-30 F & G Stage I, Phase G · Series VIII, TP-H1011 | 3. RECIPIENT'S CATALOG NUMBER |
| | 5. TYPE OF REPORT & PERIOD COVERED: Test Results - semi-annual report |
| | 6. PERFORMING ORG. REPORT NUMBER |
| 7. AUTHOR(s): 10 John A. Thompson | 8. CONTRACT OR GRANT NUMBER(s) |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS: Propellant Analysis Laboratory, Directorate of Maintenance, OO-ALC Hill AFB, Utah 84056 | 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: MMWRM Project M04046C-WNL01529 |
| 11. CONTROLLING OFFICE NAME AND ADDRESS: Service Engineering Division, Directorate of Materiel Management, OO-ALC Hill AFB, Utah 84056 (11) | 12. REPORT DATE: Apr 80 |
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Solid Propellant
Minuteman

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30 F and G First Stage Minuteman Motors. This report uses a statistical approach to analyze the bulk carton propellant data. Testing was accomplished in accordance with MMWRM Project Mo4046-WNL01529.

The data from this test period are combined with data from previous testing and entered into the G085 computer for storage, analysis and regression analysis. From the statistical analysis of all data tested to date (fourteen years for

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F and G), significant degradation of the propellant does not appear linely for at least two years past the oldest data point.

Each point on the regression plot represents the mean of all samples at that particular age. The number of samples at each point in indicated on the sample size summary sheet on the page accompanying each regression plot or group of regression plots. The data range at any age can be found by suitable inquiry of the GO85 system.